plating

JOURNAL OF THE AMERICAN ELECTR

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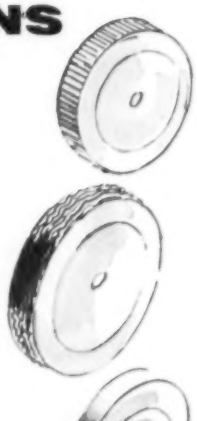

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plating

Journal of the American Electroplaters' Society

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Published by the American Electroplaters' Society, Incorporated, 445 Broad Street, Newark 2, N. J. Phone: HUmboldt 2-3400. Yearly subscription for Members $2.00. Nonmembers U. S. and Canada $5.00, 65c a copy. Foreign, $8.00 a year, $1.00 a copy.

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PLATING is abstracted regularly in Chemical Abstracts, Metals Review, Metallurgical Abstracts, Engineering Index, Technical Data Digest, and Bulletin Analytique.

Statements of fact and of opinion given in articles and papers in PLATING are those of the contributors. The American Electroplaters' Society assumes no responsibility for them.

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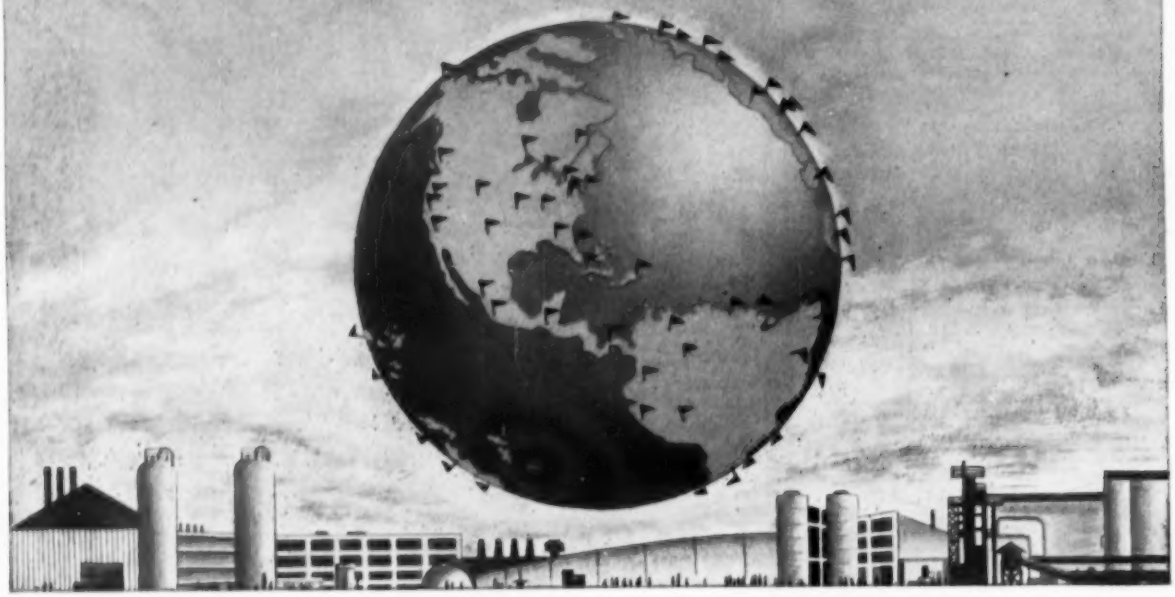

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EDITORIAL

BREAKING BARRIERS

IT IS POPULAR TODAY to refer to barriers of various kinds. In the news from Antarctica we are told of huge ice barriers which delay the accumulation of information regarding that great geographic area of the earth. In the realms of politics and economics we are faced with the tenuous but none the less tangible barrier called the Iron Curtain. In the world of boat racing it was believed until a few years ago that there is a water barrier, that is, a speed above which a surface boat cannot go without being pounded to pieces. Then there was the sound barrier. Dreaded for years by the progressive aviation industry as a fundamental limit to the possible speed of aircraft this was long a deterrent to progress. Each of these barriers has been breached successfully even though it may remain formidable. The next one facing the aircraft industry is the "thermal barrier", that is, the heat generated on the outer skin of a plane traveling at supersonic speeds. How can this heat be dissipated without raising the temperature of structural parts to the point of loss of strength?

The plating industry can take a lesson from the great aircraft industry in how to break a technological barrier. Our great barrier to progress has long been what we call the "porosity" of electrodeposits. Two generations of plating engineers and electrochemists have worked and studied to understand this phenomenon.

What is "porosity"? What do pores look like in a one-mil or thicker deposit which has never been exposed to a corrosion medium? Why has this seemingly simple problem eluded explanation when so many people have worked on it so long?

This is where we can learn from the aircraft industry. How was the sound barrier broken through? The answer is obvious — by research. But the important point is that in this research use was made of many disciplines, not just one. The great work directed by the National Advisory Committee for Aeronautics has made use of not only aerodynamics but also mathematics, ballistics, physics, electronics, metallurgy, chemistry and even medicine! In the present assault upon the thermal barrier even the electroplater is being called upon to change the ability of alloy surfaces to radiate and to reflect heat.

It is interesting to note that the N. A. C. A. is a committee of men who serve without pay, just as do the members of our own Research Committee. The principal difference, other than the size of their budget, lies in the fact that the aeronautical projects utilize the talents of many kinds of scientists and engineers.

Electrochemists working alone have failed to provide the key to the mystery of porosity. We must call upon the new knowledge and techniques of the metallurgist, the solid state physicist, the electron microscopist to bring out the true nature of the atomic structure of electrodeposited metal. These scientists will tell us that there must be some kind of defect or disorder in the otherwise regular lattice arrangement of atoms in the deposited metal crystals which permits corrosion to start at isolated points. Having found such defects it will be relatively easy to explain the rate of penetration of pores as they progress to the interface and lay bare the surface of the basis metal to attack. Until we learn their nature we cannot even guess what can be done to alter those defects.

No single company can be expected to bear the expense of a basic and complex research of the scope indicated above. On the contrary it is a proper study for our Research Committee to sponsor. It is to their credit that an excellent start has been made toward that goal in the activities of several of the Projects instituted to date.

W. Andrew Wesley

Third Vice President

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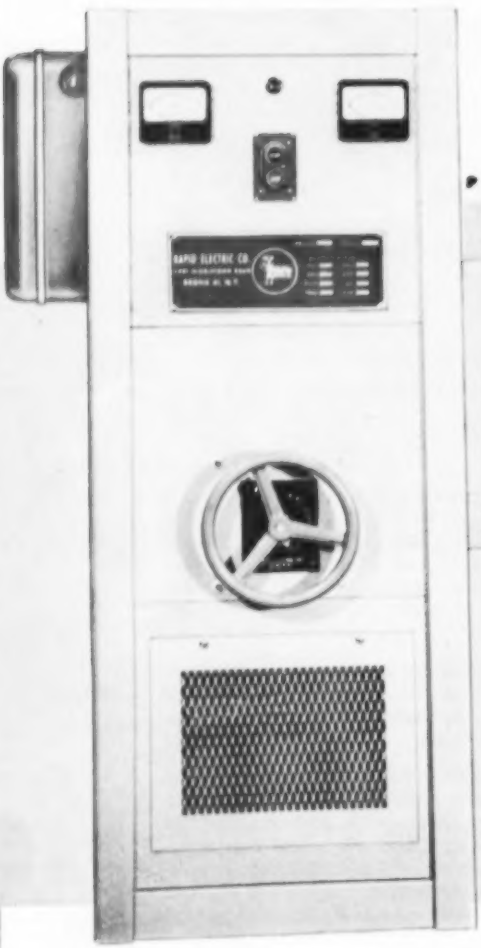

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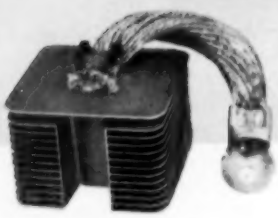

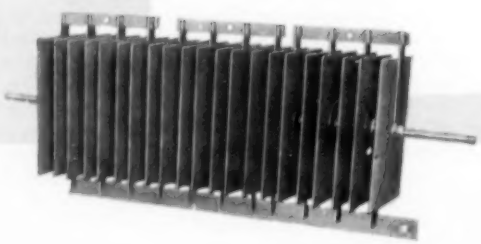

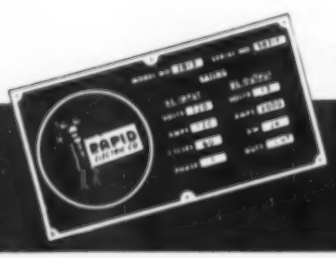

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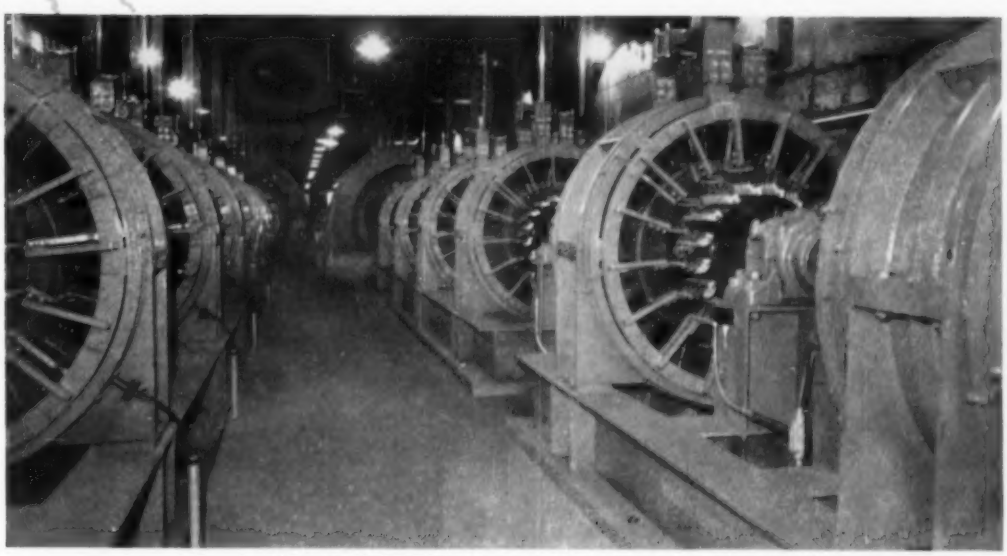

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DU PONT *PRODUCT NEWS*

Cyanobrik® sodium cyanide gives you extra-high purity, safety and convenience

You can count on outstanding results when electroplating with "Cyanobrik" sodium cyanide. It's a high-purity product whose uniform quality is assured by the production techniques used at Du Pont's modern new plant in Memphis, Tenn.

Just a twist of a wrench is all it takes to unlock the full-open-head drums used to ship "Cyanobrik." Note the absence of sharp or ragged edges. And "Cyanobrik" drums are re-closable—an important feature from Du Pont that can save you money when storing unused contents.

Just look at these specifications for "Cyanobrik":

Sodium cyanide	**96% minimum**
Sodium chloride	**0.2% maximum**
Sulfides (as sulfur)	**0.0005% maximum**

Yet, as this typical analysis shows, Du Pont delivers an even higher-quality product:

Sod. cyanide 97.5%	**Sod. formate . . . 0.35%**
Sod. hydroxide . . . 0.4%	**Sod. chloride. . . 0.1%**
Sod. carbonate . . . 1.5%	**Water 0.15%**

Sulfides (as sulfur) . . . 0.0004% (4 ppm)

This extra-high purity means you can always depend on Du Pont "Cyanobrik" sodium cyanide for your plating jobs—including the most critical.

For your *extra safety and convenience*—Du Pont "Cyanobrik" is shipped in full-open-head drums. There are no exposed or ragged edges when opening or closing drums. The reclosable-drum feature is a Du Pont specialty and provides full protection for the unused contents.

"Cyanobrik" itself is made in the form of 1-ounce, pillow-shaped briquettes. These uniformly sized briquettes are convenient for measuring small quantities. Dusting is minimized, and accidental spillage can be cleaned up quickly and safely.

Another extra—Du Pont service

Du Pont's plating experts—backed up by a fully equipped Sales Technical Laboratory—are always ready to provide on-the-spot service. It's a money-saving advantage you get when ordering sodium cyanide from Du Pont—a reliable domestic supplier—always close at hand.

Call your nearest Du Pont sales office or check and return the coupon.

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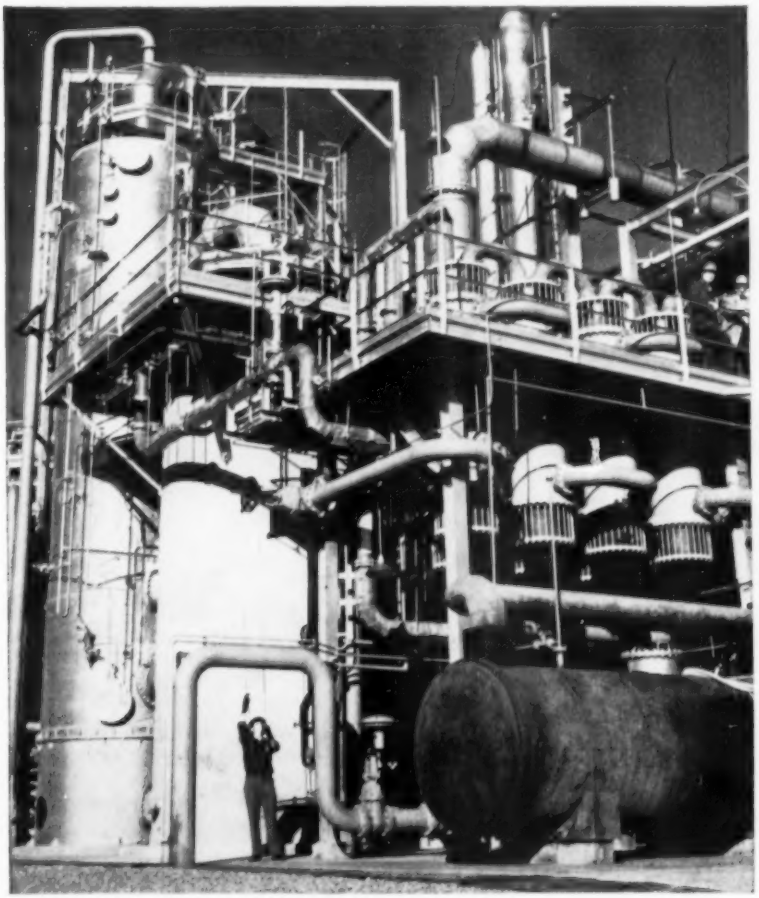

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Mixed shipments of sodium cyanide and potassium cyanide available from Du Pont's Memphis plant . . .

A modern Du Pont plant in Memphis, Tennessee, is on stream, producing the highest-purity sodium cyanide and potassium cyanide available for your plating operations. Orders for mixed shipments will save you time, money and storage space. Call Du Pont and take advantage of this service.

Rigid specifications assure high purity of Du Pont Potassium Cyanide

Constant research into improved plating techniques puts Du Pont Potassium Cyanide to frequent test. This serves as a check on the high purity of the product and its performance. Reports from the field through Du Pont technical men are still other means of checking on-the-job performance. That's why Du Pont can guarantee the high purity of its potassium cyanide.

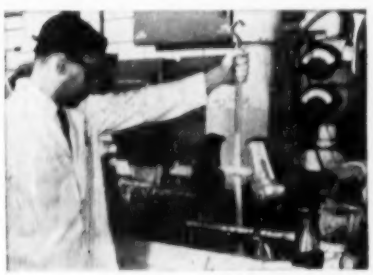
Here's what the rigid specifications of Du Pont Potassium Cyanide call for:

Potassium cyanide 98.0%
Potassium chloride 0.5%
Sulfides (as sulfur) 0.0003% maximum

A typical analysis shows Du Pont Potassium Cyanide actually to be even higher in purity.

Potassium cyanide 98.3%
Potassium chloride 0.05%
Sulfides (as sulfur) Less than 1.5 ppm

Next time you order potassium cyanide, call Du Pont. You'll get product quality and service that's the finest in the field.



HIGHEST QUALITY. You can always count on Du Pont Potassium Cyanide to give top plating results. It's a 98% pure plating chemical. You get Du Pont's money-saving technical service, too.

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UNICHROME

News about

COATINGS for METALS

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New type chromium plate improves products

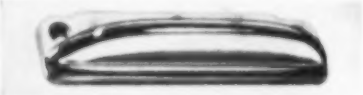
Why Crack-Free Chromium gives superior finish

Regular chromium plate develops a network of cracks as it is deposited. Through these defects, corrosives reach the underlying metal. Deposits from the Unichrome Crack-Free Chromium Plating Process remain structurally sound and continuous. This explains the wide difference in degree of corrosion protection obtained.

OTHER PROPERTIES

Crack-Free Chromium also provides:

1. Increased ductility, so that expansion and contraction cause no cracks.
2. Improved non-galling, non-seizing properties.
3. Low friction, resistance to wear.
4. Hardness (500 to 700 Knoop).
5. Excellent leveling action to help cover surface irregularities and reduce grinding needs.
6. Protection to the base metal without undercoats.
7. A satin matte *decorative* finish that can be applied directly to zinc die casting as well as steel. It buffs readily to high luster, can provide two-tone effects as shown below.



Bulletin CFC-2 gives more details on self-regulation and other features.

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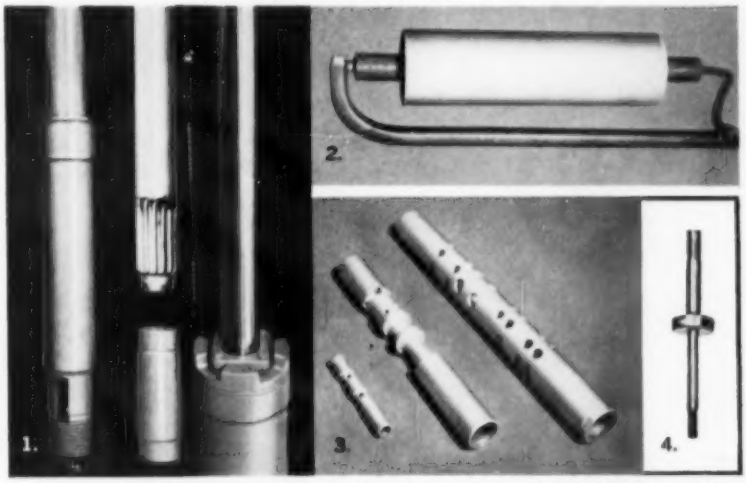


A few of the applications where Unichrome Crack-Free Chromium can be used to protect against corrosion, heat, wear. (1) Washer shafts and sleeve; hydraulic ram. (2) Roller. (3) Heater nozzles. (4) Component part of power producing mechanisms.

Difficult problems created by heat, wear, corrosion solved by Crack-Free Chromium

Field reports confirm that Unichrome Crack-Free Chromium is truly a new type of chromium plate with valuable characteristics. It is being used in applications once thought impractical for chromium or other deposits – thereby opening new opportunities for electroplating. Here are some suggestions:

IMPROVING HYDRAULIC SYSTEMS

On hydraulic rams, power steering shafts, hydraulic jacks being plated with Crack-Free Chromium, relatively thin deposits protect against corrosion, reduce friction and wear. Where aqueous hydraulic fluid penetrated the cracks in .003 to .005" of ordinary chromium, a .0009" Crack-Free deposit stopped it.

Washing machine and typewriter parts, spline shafts, piston rings, relay armatures are other applications where corrosion problems have been solved.

COMBATING THERMAL SHOCK

Spouts for pouring 2250°F. molten glass into molds last four times longer when plated with Crack-Free Chromium instead of ordinary chromium.

Increased ductility combines with resistance to thermal shock for other benefits. Crack-Free Chromium permits faster, deeper grinding cuts without fracture. On renewed transmission cams, this plate didn't fracture in service, whereas ordinary chromium did on 30% to 40% of the cams.

SLOWING DOWN WEAR

Crack-Free Chromium enables one user to increase life of textile machine rolls by 400% while cutting chromium deposit thickness 95%. It has also increased service life of drills, taps and reamers by 300%, compared with ordinary chromium.

Results such as these are being made possible through platers who have installed Unichrome Crack-Free Chromium and are able to offer this new type of chromium. Write Metal & Thermit for more application possibilities.

HOST: AES INDIANAPOLIS BRANCH

INTERIM MEETING REPORTER

HOTEL MAROTT INDIANAPOLIS, IND. JANUARY 11, 1958

FIFTH INTERIM MEETING INDIANAPOLIS, JANUARY 11

The Fifth Interim Meeting of the Supreme Society of the American Electriplaters' Society (AES) will be held at the Marott Hotel, Indianapolis, Indiana, Saturday, January 11, 1958, with the Indianapolis Branch as host as a result of action to this effect taken by the Executive Board at its recent Detroit meeting.

Now mandatory by Bylaw provisions that such Interim Meetings be held yearly, the Supreme Society at Montreal last June vested authority in the Executive Board to select the meeting site and date of the 1958 meeting. The Board, in turn, selected Indianapolis from among several Branch bids inviting choice as Host Branch.

Purpose of this Interim Meeting is to hear reports and proposals; to consider matters referred to it by the Annual Meeting and to make recommendations to the next Annual Meeting concerning those and other matters which may come before it.

The Executive Board's announcement to the Indianapolis Branch of its selection as Fifth Interim Meeting Host Branch was received enthusiastically by that Branch through its Branch President, Bert Hawhee. Promptly, the Branch appointed a strong departmentized Interim Meeting Committee with Marshal L. Whitehurst of the Radio Corporation of America of Indianapolis as general chairman. Mr. Whitehurst and his associates will handle all meeting arrangements. Mrs. Florence Marquardt will, as usual, serve as official meeting reporter.

Composed of three Delegates from each of the AES's 57 Branches here and in Canada and Australia, the Supreme Society is the AES's governing body. The coming meeting, as stated, will be its fifth such winter meeting.

These annual meetings were first conceived and held in 1951 when the Supreme Society convened in its first such meeting in Philadelphia that winter. The Second meeting was held in Columbus, Ohio, in 1953 — the third occurred in Toronto, Canada, in 1954. None was held in 1955. Last winter at the Hotel Penn-Sheraton in Pittsburgh, Pennsylvania, with the Pittsburgh Branch as Host Branch, Delegates/Alternates of a record-breaking 25 Branches participated in the Society's most fruitful Interim Meeting to date.

The Fifth Interim Meeting will commence at 10 a. m. at the Marott Hotel in Indianapolis. It will recess for luncheon — then reconvene to adjournment. Immediately following that meeting, the Executive Board and National Headquarters will be hosts to Delegates and Alternates at a cocktail party. The Executive Board itself will meet in a full-day's session at the same hotel on Friday January 10. It will continue its meeting at the same place Sunday, January 12.

So as to enable Society Officers and Delegates/Alternates to attend, the Indianapolis Branch has scheduled a regular Branch Meeting for Friday evening, January 10.

The tentative agenda of the Fifth Interim Meeting will be published in December PLATING. President Francis T. Eddy will make that meeting's opening remarks and preside at the assembly. Reports will be provided by all National Officers, including Herberth E. Head, first vice-president; Ralph D. Wysong, second vice-president; Dr. W. Andrew Wesley, third vice-president; Dr. Samuel Heiman, past president and John P. Nichols, executive secretary.

If you are a Branch Delegate or Alternate, your place on January 11 is at the Fifth Interim Meeting at the Marott Hotel in Indianapolis, Indiana. Your mail will soon bring you an official notice.

Bert Hawhee
President
Indianapolis Branch

M. L. Whitehurst
General Chairman
Interim Meeting

INDIANAPOLIS EXPERIENCED HOST BRANCH

To the Indianapolis Branch just named Host Branch of the Fifth Interim Meeting, conducting AES meetings of magnitude and importance effectively is no new experience. Host Branch of the successful 1921 National Convention, it has been building a solid record of Society stewardship ever since.

Twenty-third largest municipality in the United States and conveniently located, Indianapolis itself offers much to see and do. Nineteenth largest Branch of the Society, the Indianapolis Branch will bring to the Fifth Interim Meeting sound leadership.

Its latest Society achievement before being tapped for Interim Meeting duty was its effective hosting last March of the lauded Tri State Regional Meeting at the famed spa at French Lick, Indiana. It drew an attendance of over 400. Branches represented there, besides Indianapolis, included Cincinnati, Columbus, Dayton and Louisville.

The Marott Hotel, Indianapolis, Indiana, site of the Interim Meeting next January 11.

SPECIAL REPORTS ON FINISHING NON-FERROUS METALS

NUMBER III—Lustrous, Corrosion-Resistant Finishing with Chemical Polishing Iridite®

WHAT IS IRIDITE?

Briefly, Iridite is the tradename for a specialized line of chromate conversion finishes. They are generally applied by dip, some by brush or spray, at or near room temperature, with automatic equipment or manual finishing facilities. During application, a chemical reaction occurs that produces a thin (.00002" max.) gel-like, complex chromate film of a non-porous nature on the surface of the metal. This film is an integral part of the metal itself, thus cannot flake, chip or peel. No special equipment, exhaust systems or specially trained personnel are required.

Chromate conversion coatings are widely accepted throughout industry as an economical means of providing corrosion protection, a good base for paint and decorative finishes for non-ferrous metals. Certain of these coatings also possess chemical polishing abilities that have luster-producing, as well as corrosion-inhibiting, effects on zinc and cadmium plate, zinc die castings and copper alloys. However, continued developments in this field have been so rapid that many manufacturers may not be completely aware of the breadth of application of this type of finish. Hence, this discussion of the many ways in which this chemical polishing characteristic can be used in final finishing or pre-plating treatments to produce a lustrous appearance with distinct display and sales appeal and appreciable savings in cost. Report I on decorative, corrosion-resistant finishes and Report II on paint base corrosion-resistant finishes are available on request.

The degree of luster possible on a surface is a function of the degree to which the surface can be smoothed. Leveling to provide a smooth surface can be achieved by mechanical or chemical means, or a combination of these, depending upon the luster desired and the original condition of the metal. Chemical polishing effectively imparts luster otherwise difficult and costly to obtain. For this reason, it is often used to supplement or entirely replace mechanical polishing, depending upon the application and the original condition of the metal. Chemical polishing has the additional advantage of providing overall treatment of the submerged part. It reaches into even the deepest corners and recesses that are otherwise inaccessible. Certain of the Iridites are specifically designed to perform this chemical polishing operation. Also, they provide corrosion protection as do all Iridites, thus may be used as a final finish or a pre-plating polish.

If Iridite is to be used as a final finish, in contrast to pre-plating treatment, the chromate conversion coating generated is allowed to remain, providing good corrosion resistance. Color inherent in these Iridite films ranges from a yellow cast to yellow iridescent. These coatings may be used without further treatment where this color is acceptable and good corrosion resistance is desired. Further, these basic coatings can be tinted by dyeing. Among the dye tints available are shades of red, yellow, blue and green. If desirable, the basic coatings can also be modified by a bleach dip leaving a clear bright or blue iridescent finish. In all cases bleaching reduces corrosion resistance.

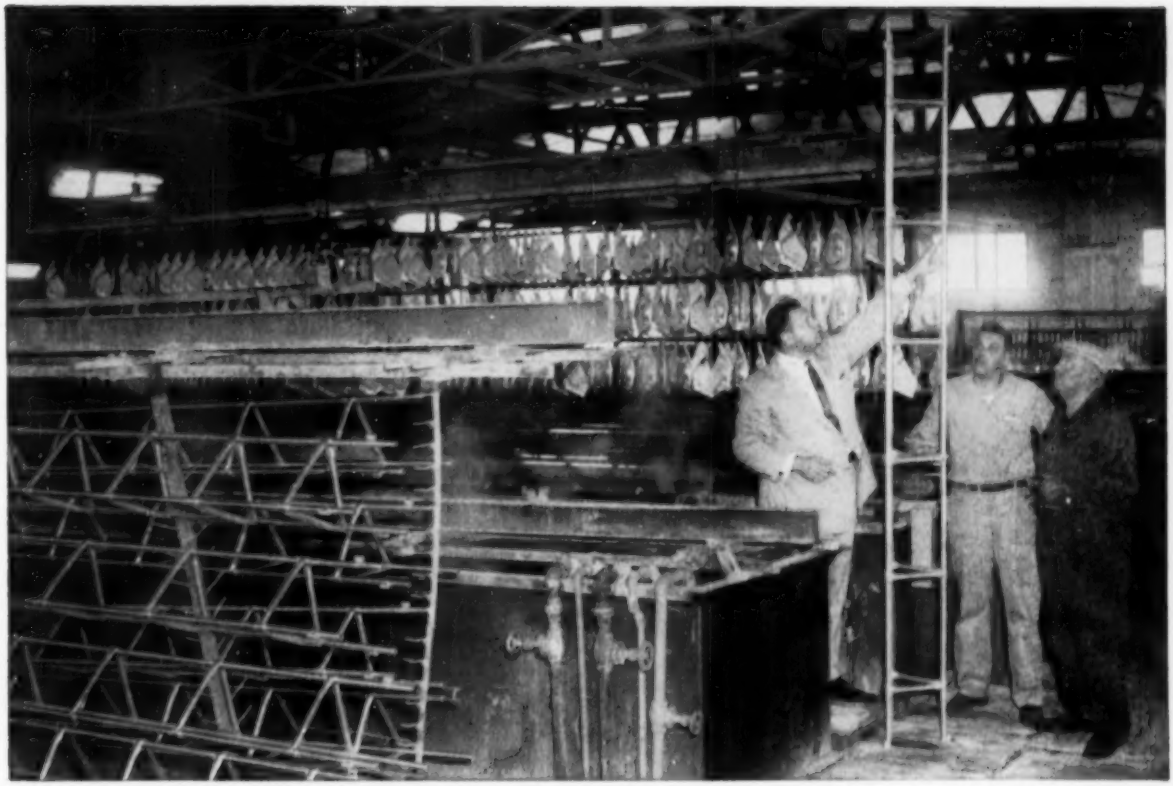
As examples of this type of final finishing, Iridites #4-73 and #4-75 (Cast-Zinc-Brite) make possible for the first time, lustrous chemical polishing of the as-cast surface of zinc die castings. Thus, in many cases, sizeable savings in finishing cost are realized by elimination of plating costs. This economical method can be used on tools, appliance parts, toy pistols, locks and many other small castings. Another example is the treatment of copper and brass parts, such as welding tips, to eliminate buffing and provide additional corrosion resistance. In many cases, handling costs are reduced appreciably by replacing piece-part handling with bulk processing. Still another example of the use of this chemical polishing and protective quality of Iridite is a simple system of zinc plate, Iridite and clear lacquer instead of more costly electroplated finishes. Typical of this type of lustrous finish are builders hardware and wire goods.

As a pre-plating treatment, in contrast to final finishes, Iridite can be used to chemically polish zinc die castings or copper prior to plating. In such cases, Iridite should be applied as an in-process step, so that the protective film is removed before the plating cycle. The savings in handling, material and labor costs are obvious. This process has made it practical to plate chrome directly over copper on steel, conserving nickel, yet producing a lustrous chrome finish. Used after stripping faulty plate in reprocessing zinc die castings, Iridite restores luster to the casting, thus making possible replating without blistering.

Other Iridite finishes are available to produce maximum corrosion resistance, a wide variety of decorative finishes and excellent bases for paint on all commercial forms of the more commonly used non-ferrous metals. As a final finish, appearance ranges from clear bright to olive drab and brown and many films can be bleached or dyed. As a paint base Iridite provides excellent initial and retentive paint adhesion and a self-healing property which protects bare metal if exposed by scratching. Iridites have low electrical resistance. Some can be soldered and welded. The Iridite film itself does not affect the dimensional stability of close tolerance parts.

Iridites are widely approved under both Armed Services and industrial specifications because of their top performance, low cost and savings of materials and equipment.

You can see then, that with the many factors to be considered, selection of the Iridite best suited to your product demands the services of a specialist. That's why Allied maintains a staff of competent Field Engineers—to help you select the Iridite to make your installation most efficient in improving the quality of your product. You'll find your Allied Field Engineer listed under "Plating Supplies" in your classified telephone book. Or, write direct and tell us your problem. Complete literature and data, as well as sample part processing, is available. Allied Research Products, Inc., 4004-06 East Monument Street, Baltimore 5, Maryland.

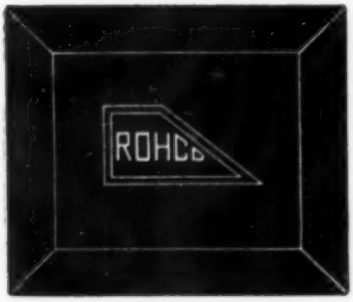


Messrs. Nick and Dick Servatius of Modern Plating Corp., Freeport, Illinois, and Ed Wild, Ardco, Inc., are enthused over the results obtained with ROHCO 503 ZINC BRIGHTENER

"ROHCO® 503 *is ideal for our two 6,000 gal. zinc tanks . . .*"

Modern Plating Corp. has grown to be one of the largest as well as progressive plating shops in the Midwest . . . with 42,000 sq. ft. of floor space under one roof devoted to plating and rustproofing. Their large semi-automatic zinc line consists of 15 tanks—25 ft. long, 6 ft. deep and 5 ft. wide. It enables them to handle parts up to 24½ ft. long. After experimenting with various zinc brighteners and addition agents, they have adopted ROHCO 503 Brightener. It enables them to produce zinc plating of unsurpassable quality and brightness with the minimum of effort and expense. In their unusually large plating tanks, Modern Plating Corp. claims ROHCO 503 Zinc Brightener contributes maximum satisfaction to the customers and profit to the plater.

Find out how 503 and other ROHCO Addition Agents will do wonders in your plant!



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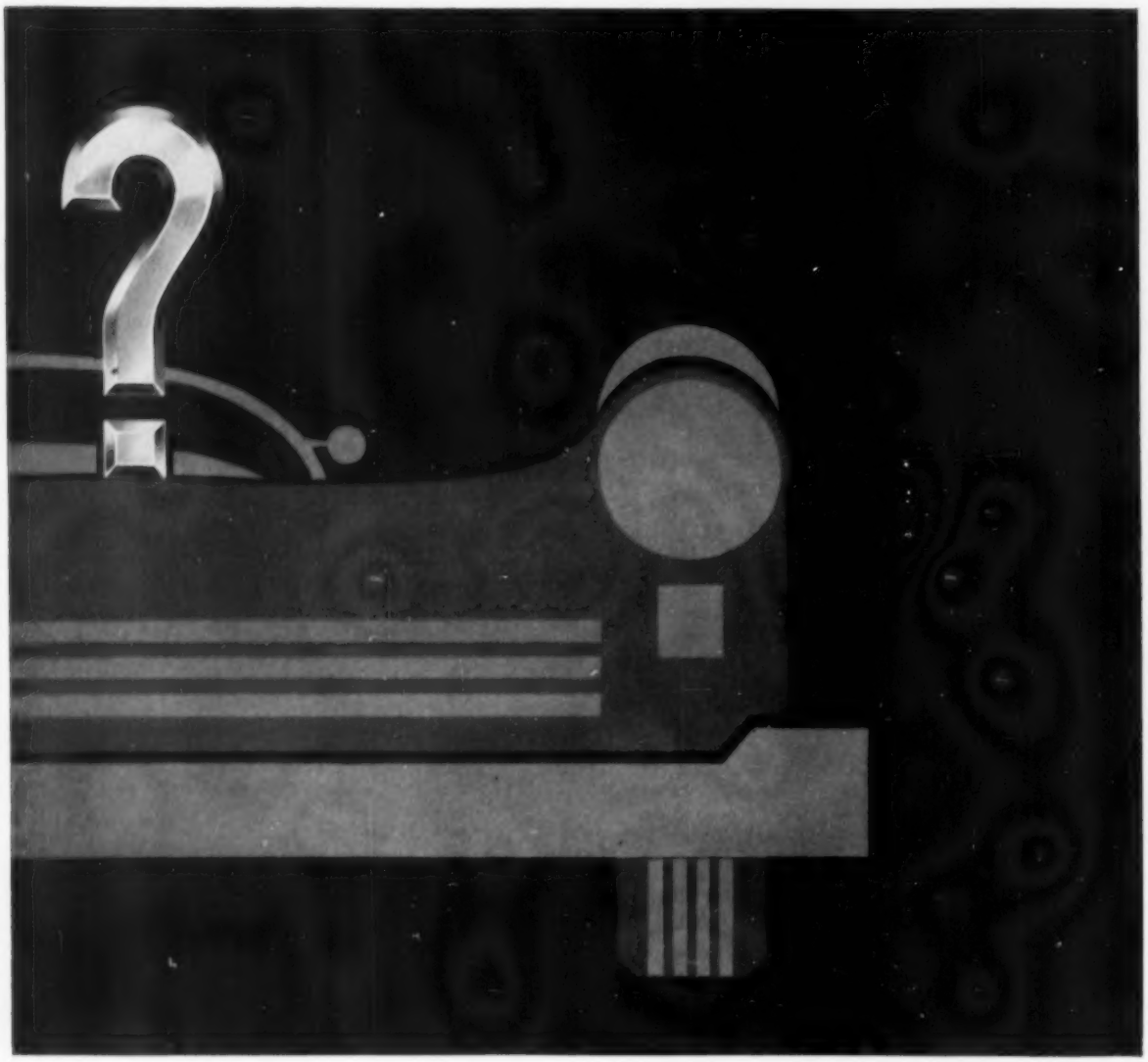


Grill Diamond's service department on chrome plating

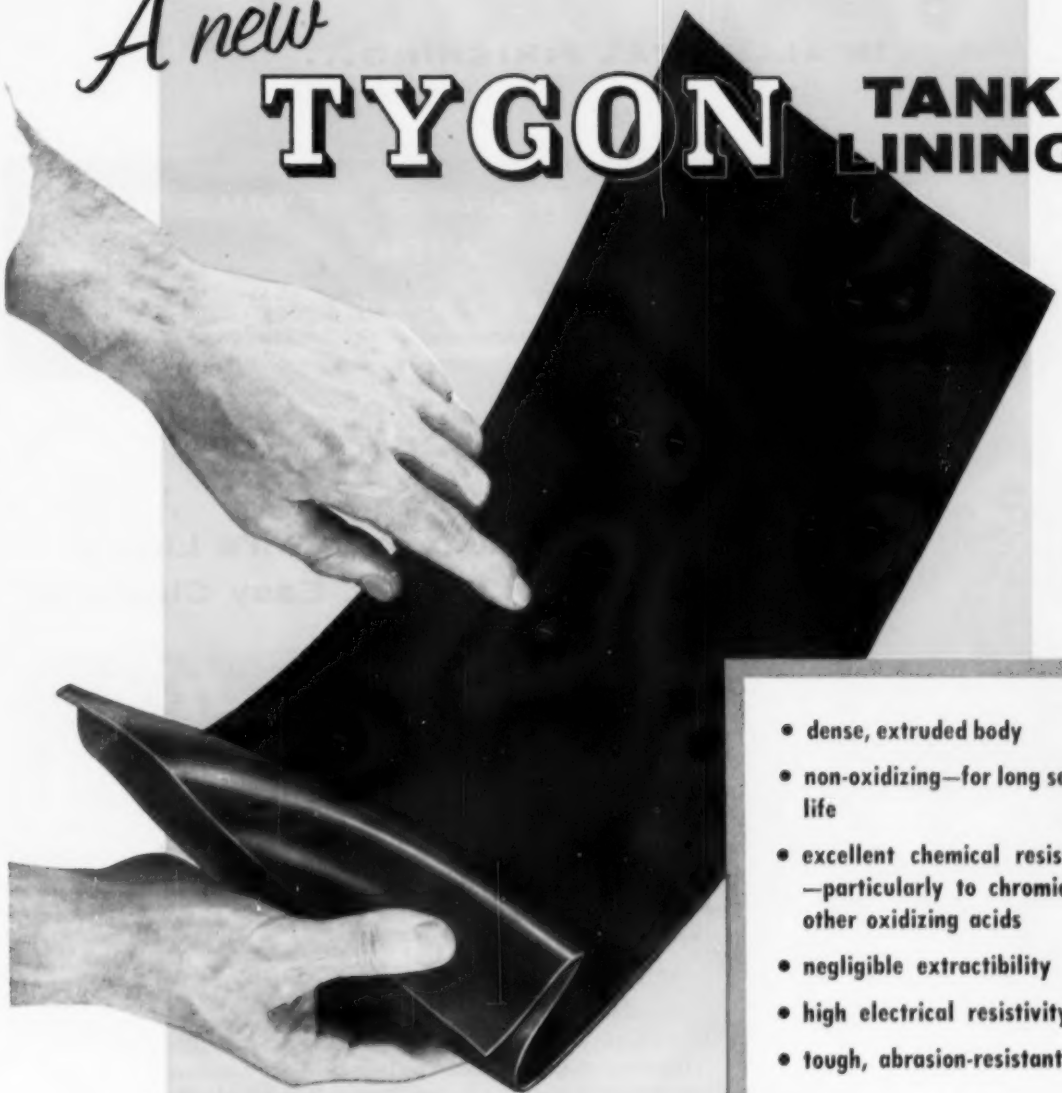
Call in DIAMOND technical specialists when you run into a chrome-plating problem. These experienced men work only on customers' questions. They deliver complete, profit-making answers. Their service is free.

In making chromic acid, DIAMOND controls quality through every step. DIAMOND experience begins with importing the chrome ore and making the soda ash. It includes production and delivery . . . even standing by your side, if you wish, to help you get top-quality plating results at low cost.

DIAMOND facilities—two chromic acid plants and nine warehouses and sales offices across the country—assure you uninterrupted service from a dependable source of supply. DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, Ohio.

Diamond Chemicals

A new TYGON TANK LINING



- dense, extruded body
- non-oxidizing—for long service life
- excellent chemical resistance —particularly to chromic and other oxidizing acids
- negligible extractibility
- high electrical resistivity
- tough, abrasion-resistant

This new Tygon tank lining material (Formulation 105A) represents a major step forward in the development of plastic linings for corrosive service. This new lining is *extruded*, not calendered. It is completely free of laminations, hence no "peeling" in service. It shows excellent resistance to highly oxidizing acids, including chromic.

103-F

Tygon Tank Linings can be installed at our plant or in the plants of licensed fabricators throughout the United States and Canada. Write today for Bulletin TL-526R.

U. S. STONEWARE
AKRON 9, OHIO

IN ALL METAL FINISHING...

YOU GET MORE BUFF MILEAGE WITH

Liquimatic®

It's Automatic...It's Liquid... Fast Cutting, Easy Cleaning

On any buffing job, from heavy cuts to extremely high color, Liquimatic saves the buff, does cleaner work, faster. Liquimatic harnesses the heading-up properties of your buffs. The compound does the work, *not* the buff. Buffs last up to 200% longer!

Liquid compound is applied automatically; there's no time lost replacing bars by hand. You save compound, get the exact amount—metered for the job, plus exactly controlled viscosity.

Liquimatic saves maintenance costs and time. There's no nubbin pile and disposal to worry about. It's water-soluble for easy, quick wash-down. Long-lived and non-settling, it stores well at all temperatures. High flash point means safety in use.

Check your production costs against all of the cost-saving features of Liquimatic. You'll find all of Liquimatic's advantages in a new folder. Write for it today. **Hanson-Van Winkle-Munning Company, Matawan, New Jersey. Offices in principal cities.**

GET A FREE "LIQUINALYSIS" RIGHT IN YOUR PLANT

An H-VW-M engineer will demonstrate the Liquimatic Automatic System, without obligation, right in your own buffing room. You can quickly learn how much you can save, if you are now using bar compounds . . . and how much H-VW-M Liquimatic compound will save over other liquid compounds.

If you require a special formula, you'll see how easy your needs can be analyzed, and how the exact compound can be prepared to meet any viscosity or consistency, to suit any application from heavy cut to extremely high color.

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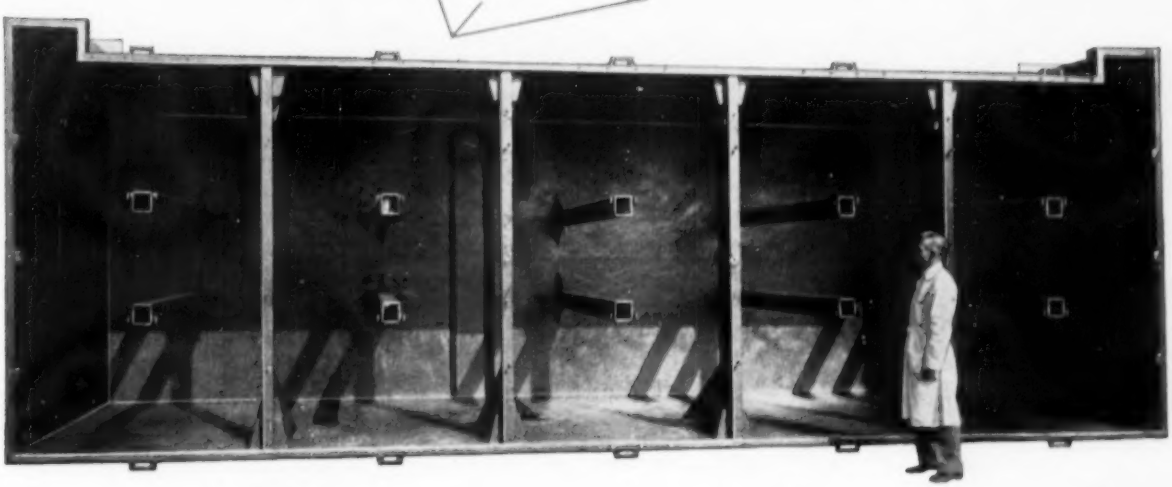
PLATEMANSHIP—Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

MICCROSOL

SPRAY S-2003

helps *Udylite* break another size barrier!



30' x 9' x 9' 4" plating tank lined by Udylite with Miccrosol Spray S-2003.

Another size barrier in the coating industry was broken when this 11½-ton plating tank was lined with a 3/16"-3/8" coat of Miccrosol Spray S-2003. The combination of Udylite's efficient 31-foot oven and Miccrosol Spray S-2003 made it possible.

The tank was placed in the oven, coated by spraying, and then cured. When removed, the job was complete.

Miccrosol Spray S-2003 was selected by Udylite for this job both because it could be applied under these unusual conditions and for its outstanding performance as a lining for plating tanks. This material, combined with their facilities, enabled them to turn out a top quality coating job which heretofore would have been impossible.

Write for complete information on your company letterhead.

MICCRO Products — *Developed and manufactured by experienced platers and coaters.*

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Four Different TUMBLEX® Abrasives assure best possible results in barrel finishing. TUMBLEX "A", most popular for general needs, removes flash, scale, burrs and tool marks, while forming radii and finishes to required microinches. TUMBLEX "T" is bonded, triangular and fast-cutting for special intricate parts, and won't wedge in work slots or holes. TUMBLEX "S", exceptionally dense and long lasting, is bonded spheres that get into areas where other shapes won't reach. "A", "T" and "S" are all made of famous ALUNDUM® (aluminum oxide) abrasive. TUMBLEX "N" is natural stones, exclusively Norton, of rounded shapes that bring up high lustre, especially on die castings and soft metals.

HERE'S HOW TO

Choose the best abrasive for any metal finishing job

Better Polishing With Every Set-Up — wheels or belts — is easy when you standardize on Norton ALUNDUM abrasive grain. All types are extremely hard and tough, uniform in size, structure and chemical composition and have high capillarity for easy wetting. Type "S", sizes 14 to 90 grit and Type "R", sizes 100 to 240 grit, are noted for fast cutting and the satin finish which they produce. Type "B", sizes 20 to 600 grit, is an all-purpose, blocky, durable grain capable of producing fine finishes.

Fast Cut. Norton ARROW-BLAST® aluminum oxide grain cuts faster than natural abrasives and reduces dust on pressure blasting jobs to minimum. And remember, the less dust in any environment, the longer your operators can work, and the more they'll finish — at lower cost.

Norton tumbling, polishing and blasting materials add "Touch of Gold" advantages to countless applications

Your metal parts can range from tiny needles to hefty forgings. They may be simple or complicated, hard or soft. Whatever they require in polishing or finishing, you can get plenty of "Touch of Gold" benefits from the wide range of Norton abrasives. Find out how. Ask your Norton Distributor for the illustrative, instructive booklets on barrel-finishing, metal polishing, or both. Or write to NORTON COMPANY, General Offices, Worcester 6, Mass. Plants and distributors around the world.

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A FULL LINE OF

Luster-on® POWDERS

FOR CHROMATE TREATING

ZINC

#50: Bright, clear, lustrous, nickel-like, corrosion-resistant; requires leach.
#51: Similar to #50, but bluish chrome-like color.
#52: Low-cost, no leach, bright, passive.

CADMIUM

#50: See under Zinc, above.
#53: Improved solubility, control, safety in handling; requires leach.

COPPER & BRASS

Cobra: Bright, yellowish, decorative and/or protective film, non-fuming, single dip.

ALUMINUM

222M Sealer: Clear or colored film for corrosion protection and paint bond.

MAGNESIUM

MPD 60: Yellowish film for corrosion protection and paint base.

Data Sheets and Prices on Request. Send in part for free processing.

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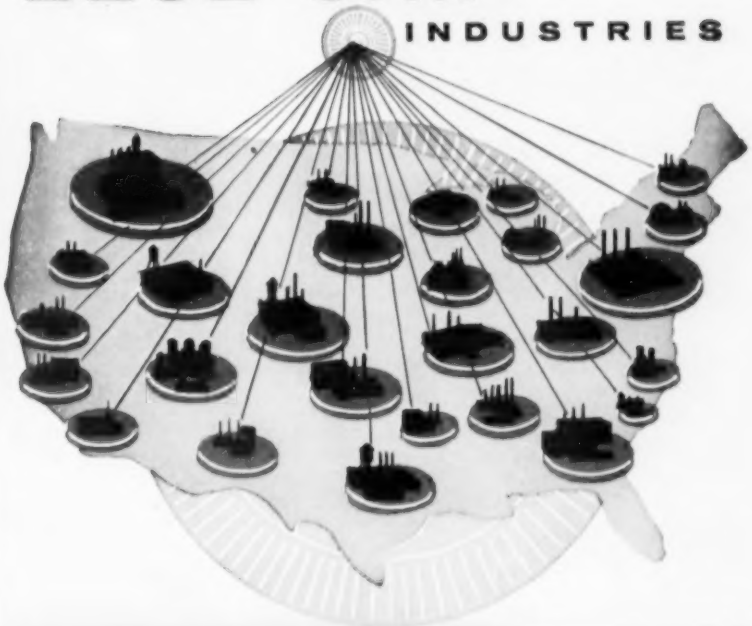

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Meaker equipment is used for efficient and economical plating by many of the nation's most important builders of such products as automobiles, appliances, machinery, furniture and many others. When they install Meaker engineered equipment they are assured that it is designed to meet specific requirements. They are also certain that Meaker will stand behind the equipment during its whole operational life, making sure that it produces the best possible plating job at reasonable unit costs.

Meaker has accomplished much for other manufacturers. Why not find out what we can accomplish for you? Our engineers will be happy to survey your problems with you and recommend the equipment you need. Call or write today!

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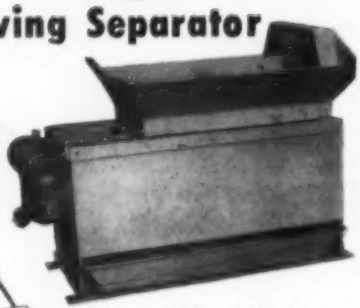
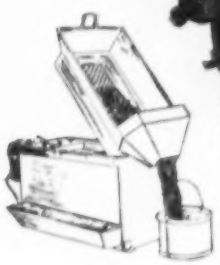
● Full Automatic and Semi-Automatic Plating Machines ● Strip Steel Plating Equipment ● Wire Galvanizing Equipment ● Batch Type Plating Machines ● Pickling Machines ● Motor Generators for Plating ● Processing Conveyors ● Rectifiers for Plating

If you don't find it here Write BELKE

Time Saving Separator

for Burnishing Balls, Chips or Sawdust





Just pour mixed work into hopper and press button. Motor shakes hopper and burnishing balls, chips, etc. fall through screen—leaves clean work in hopper.

Hopper tilts to pour out work—Balls, chips, etc. fall into removable tray.

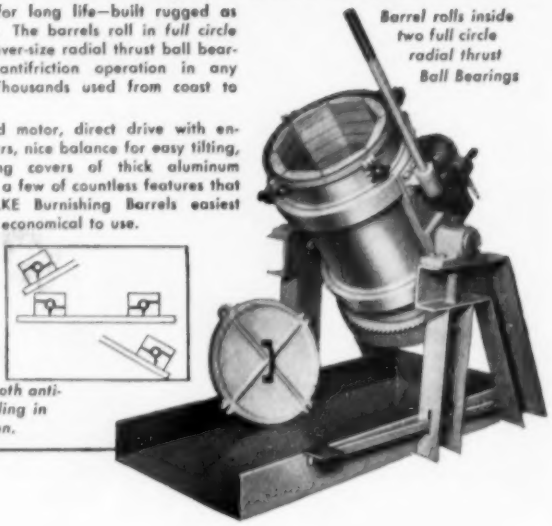
Shaker rides on ball bearing rollers. Hopper sides lined with wood to protect parts with high finish.

BELKE Heavy Duty Burnishing Barrels

Designed for long life—built rugged as bulldozers. The barrels roll in *full circle* patented over-size radial thrust ball bearings for antifriction operation in any position. Thousands used from coast to coast.

Gear head motor, direct drive with enclosed gears, nice balance for easy tilting, self sealing covers of thick aluminum plate, are a few of countless features that make BELKE Burnishing Barrels easiest and more economical to use.

Barrel rolls inside two full circle radial thrust Ball Bearings



Patented radial thrust ball bearings assure smooth anti-friction rolling in any position.

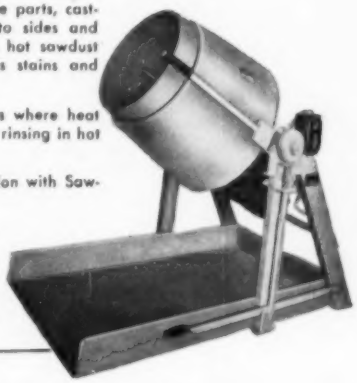
Steam Heated Sawdust Barrel

A big money saver in drying and brightening small stampings, machine parts, castings, etc. Steel ribs welded to sides and bottom tumble the work. The hot sawdust brightens the work, eliminates stains and water spots.

Also used for other operations where heat is required such as washing or rinsing in hot solutions.

Can be furnished in combination with Sawdust Separator.

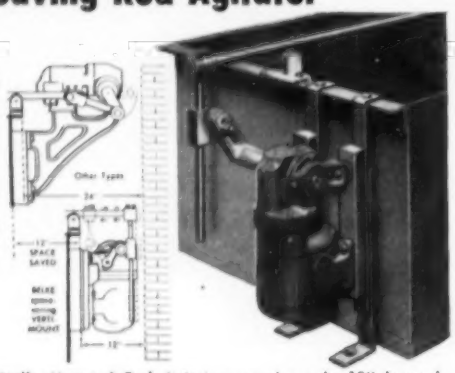
Dries work FAST with Bright, Spotless Finish.



Space Saving Rod Agitator

Saves half the space required by other rod agitators.

Easily installed on lined tanks. —Bolts to tank flange and floor— Brackets furnished for specified tank height.

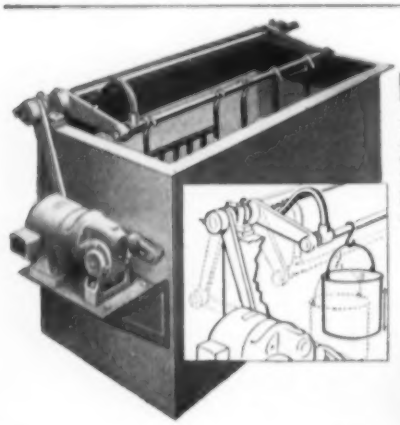


BELKE Vertically Mounted Rod Agitators require only 12" beyond end of tank where others require 24". This improved agitator moves work back and forth like other rod agitators but *does not* lift the end of the rod. Designed for installation after tank is lined or installed.

Oblique Tumbling Barrel

For mixing, cleaning, drying, burnishing—Just pour the work in and turn the switch. Tilt the barrel and pour out when finished.

Well balanced—tilts easily. Locks and operates at any desired angle. Approximate load capacity 2.3 cubic feet. Other sizes to order. Furnished with steel or wood barrel cylinder.



Improved Motorized Slusher

Saves 90% of time required to clean articles in cleaner bath. Just hang the work on the cross bar in baskets, on racks or on wires.

The motor moves the bar up and down, with a positive churning motion. Forces solution in and out of intricate openings difficult to clean by hand.

Belke Manufacturing Company
947 N. Cicero Ave., Chicago 51

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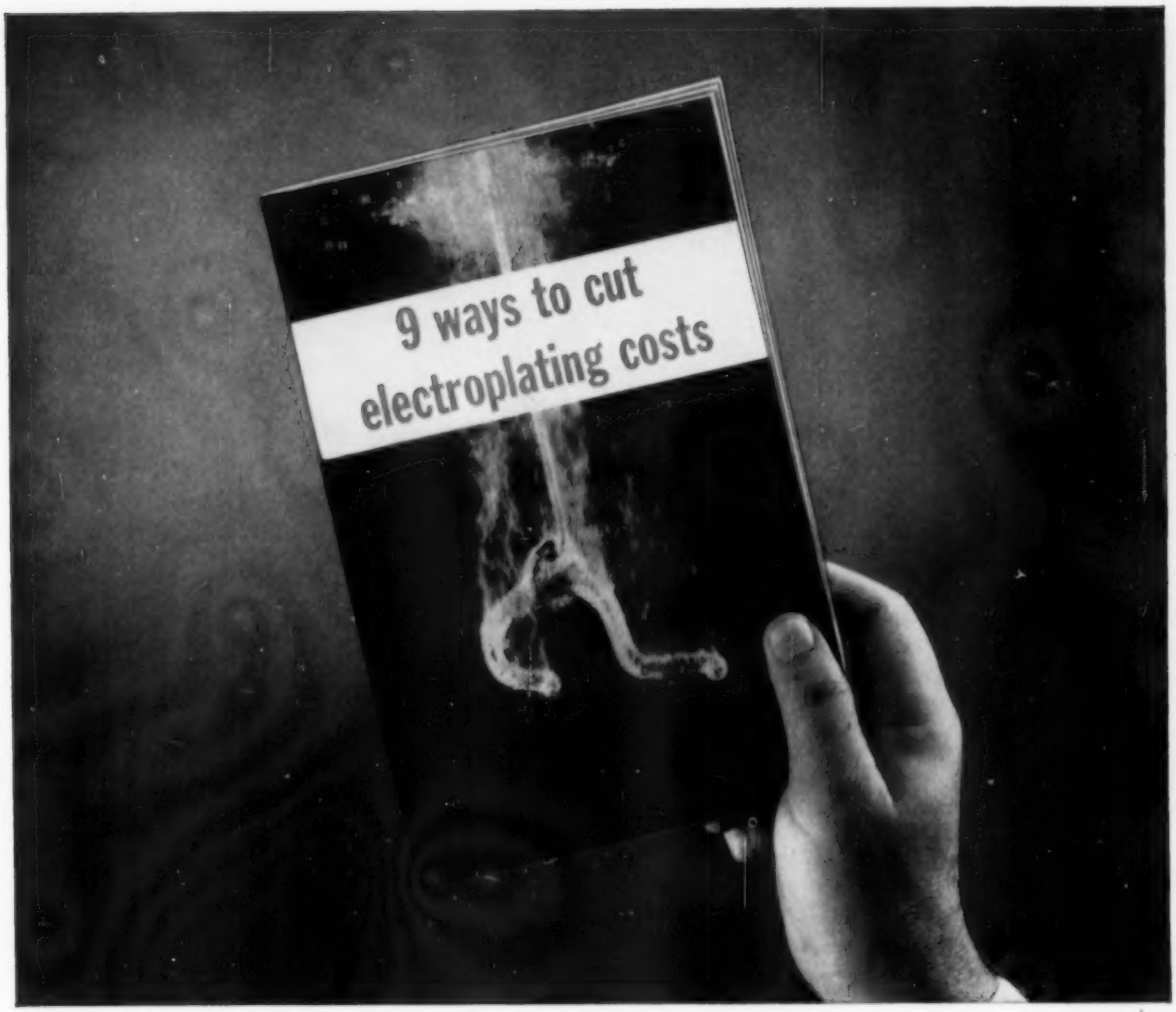

Order your free copy now

"9 WAYS TO CUT ELECTROPLATING COSTS" brings both new and old tricks-of-the-trade together in one handy booklet. These are practical tips and ideas you can use to lower production costs.

Of course, there are many other ways to reduce costs, depending on individual plant conditions. However, this booklet contains helpful reminders on those nine points that Diversey D-Man representatives have found *most vital* in economical electroplating.

The next time your D-Man calls to talk about electrocleaning chemicals, take a few minutes to chat with him about electroplating generally. He is well informed on new products and new techniques you can put to work in your plant.

Meanwhile, send in this coupon for your copy of this new booklet.

to: Metal Industries Division
The Diversey Corporation
1820 Roscoe Street
Chicago 13, Illinois

Please send me your new booklet, "*9 Ways To Cut Electroplating Costs.*"

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a new superior copper process

ISO-BRITE COPPER

You needed it! Wagner developed it! You'll praise it!

NEW . . . BETTER . . . BEST . . ! "Words, words, just another claim," you may think, for rare indeed is anything new really superior in your metal finishing world. But we at Wagner Brothers have spent years on the copper problem and the *production* performance of *our* new ISO-BRITE Process has encouraged us to go all out. So we're making *big claims*. But these claims have already been *proven* by the most critical of production platers—and we're anxious to prove them to you. We offer you . . .

1. Ease of control—and our proof is the voluntary praise of dozens of qualified men in automotive, hardware, plumbing and other fields.
2. High anode efficiency—virtually eliminating costly copper cyanide additions. Just replace drag-out.
3. Much heavier plate—one case previously averaging .0004" increased by ISO-BRITE COPPER to .0008" at the same check points, by eliminating sacrificial wave forms.
4. Freedom from roughness—electrolyte has no inherent tendency or characteristic to promote rough deposit. Our technical staff can advise you on contributing physical or mechanical causes.
5. Fine grained, dense, ductile deposit—fully bright coming out of the bath, easily buffed if your job is steel.
6. Wide operating range—up to 60 amperes per sq. ft. in actual production. Temperature range from 135° to 165°.
7. High tolerance of organic contamination—much less maintenance. Excellent for die castings.

Of course, Wagner ISO-BRITE Copper costs no more than competitive copper solutions—yet it saves money in every way while producing vastly higher quality. We can't hope to have you accept all we claim here; we offer the proof of the pudding. Wire, phone or write for Bulletin 70.2 and the name of the Wagner man in your area.

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Wagner BROTHERS INC.

That's Me!

A Timely Message on
Therapeutic Leisure for Dogs

(especially German Shepherds)

by Sox von Liebestraum Sax
Ex Detroit Rep. and Assistant to
Ben P. Sax, Chairman of the Board
American Buff Company

All work and no play makes "Sox" a very dull dog, German Shepherd or not. Of course, I don't have as much time for recreation as I used to before I started running American Buff Company single pawed.

For this reason, therapeutic use of leisure time is quite vital to me. And there is nothing that irritates me more than some of the snide tricks humans try to pull on us dogs.

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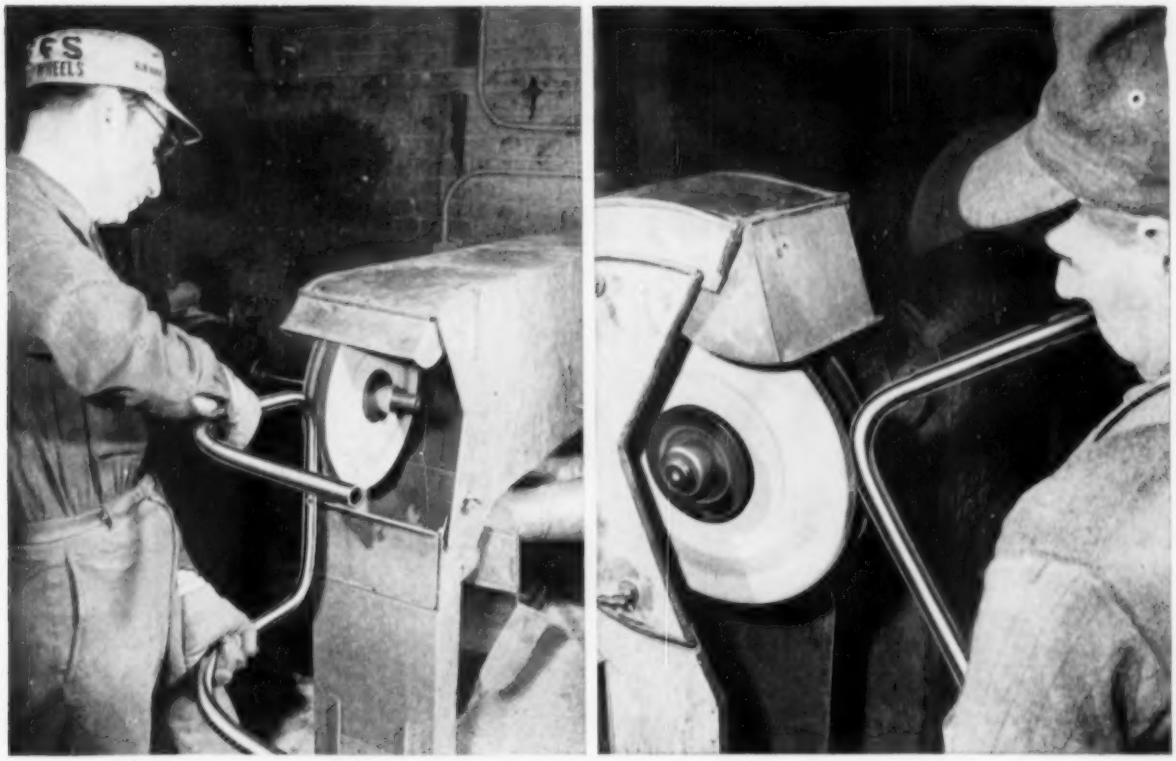

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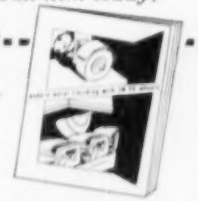

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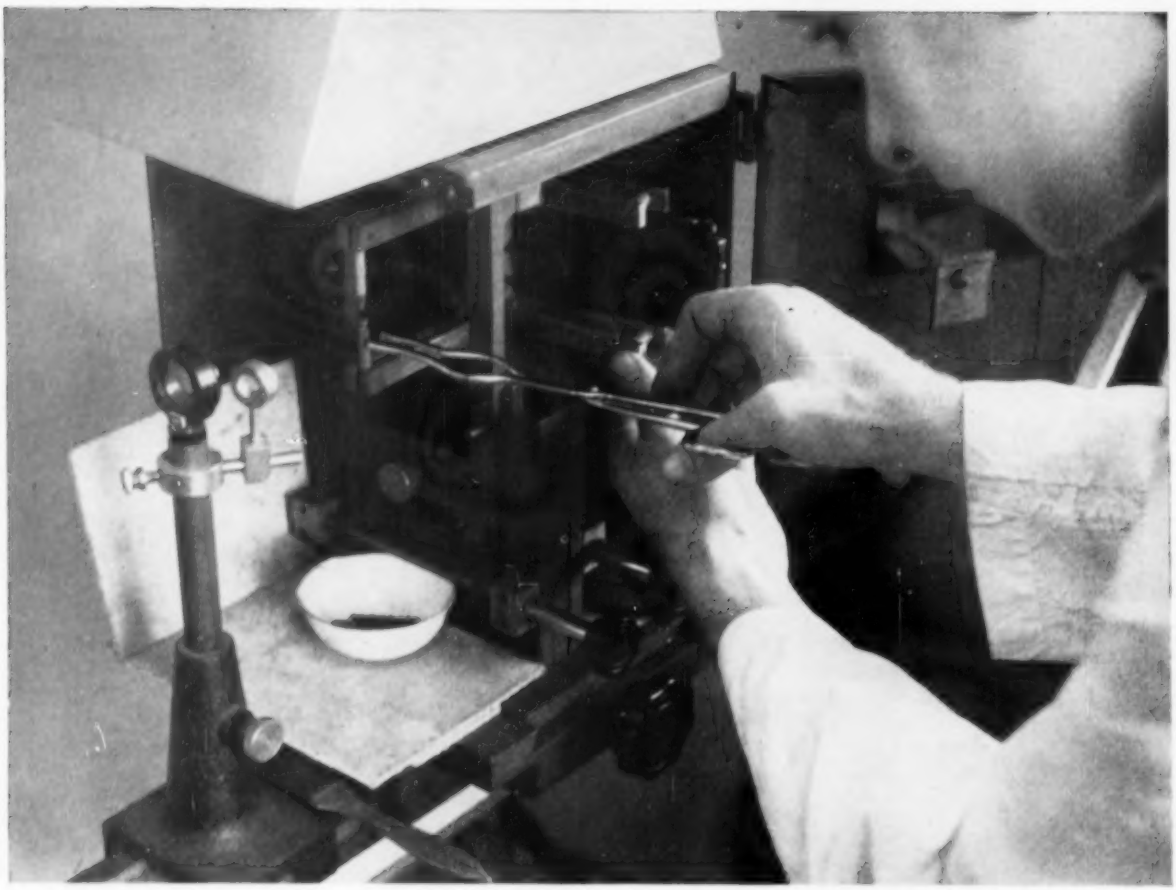

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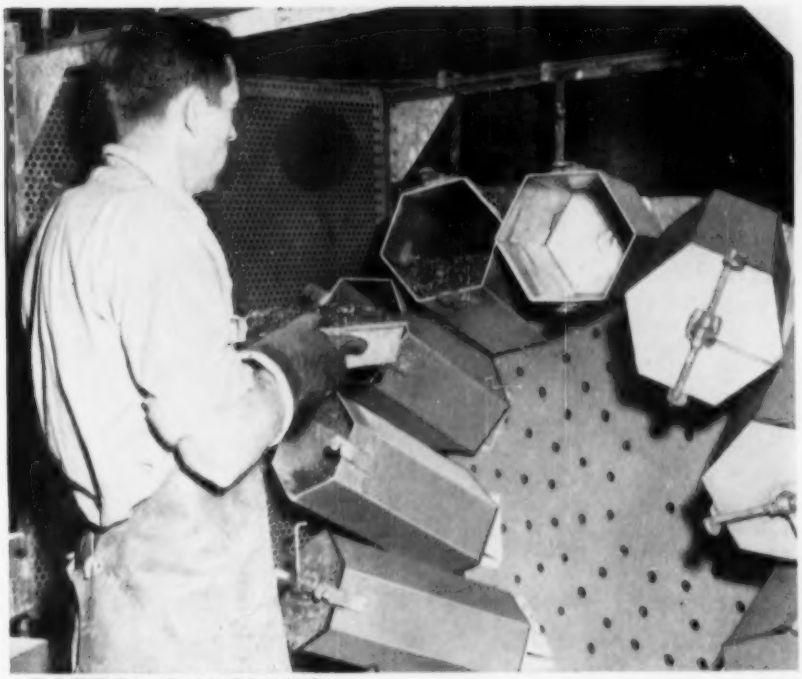

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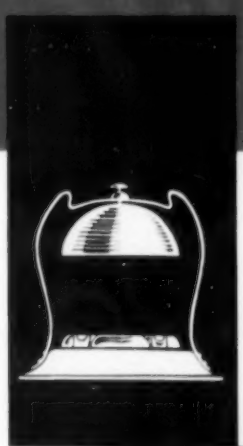

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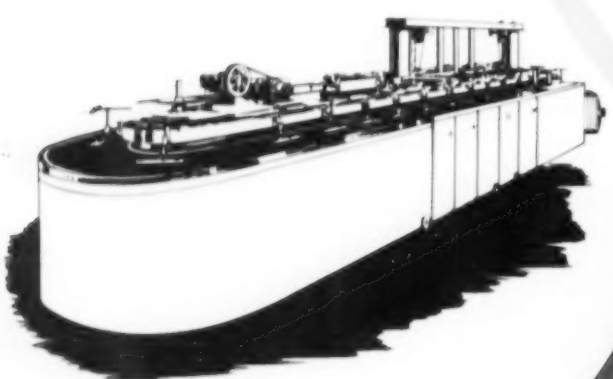

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F8U-1 Crusader coming in for landing with landing gears down.

HOW CORROSION IS REDUCED ON LANDING GEAR PISTONS

by WILLIAM L. AVES JR.*

A solution to a corrosion problem on hard chromium plated functional aircraft parts exposed to atmospheric conditions is presented. Although process qualification tests were considerably more extensive than the listed corrosion tests, they were not considered fundamental to the scope of this paper. The double zincate, copper, nickel, chromium process as presently employed on exposed hard chromium plated functional aircraft landing gear parts has adequately protected these parts against corrosion in service. The double zincate, copper, chromium process as originally employed on similar landing gear components proved inadequate in the prevention of corrosion.
A detailed method for applying zinc, copper, nickel, and chromium deposits to aluminum alloy landing gear pistons is presented. Test results obtained from corrosion panels also are included.

HIGH QUALITY MATERIALS must be utilized when constructing an airplane such as the Chance Vought F8U-1 Crusader. In order to maintain quality, those materials which are prone to corrode, erode, or otherwise be adversely affected by temperature or environmental conditions must be protected. One example of such parts subject to both abrasion and corrosion is the aluminum landing gear pistons on the Crusader (Fig. 1).

Weight is a very important factor in the aircraft industry. Utilization of relatively soft aluminum alloys for operative parts frequently requires both wear and abrasion resistant properties. This is often accomplished by applying hard chromium, or where possible a hard anodic coating to the functional surface.

For many years the corrosion-conscious automotive industry has found it mandatory to utilize a nickel plate under the bright chromium plate. Applied on both bare and copper plated steel trim, nickel plate increased corrosion resistance. Because of this a comparative evaluation on aluminum alloys was made between a zincate, copper, nickel, chromium coating and a widely used zincate, copper chromium coating.

Results of the comparative corrosion evaluation, Table I, demonstrated that the proposed plating system utilizing nickel plate was markedly superior to the conventional system using zincate, copper and chromium. The proposed system utilizing a zincate, copper, nickel and chromium coating was, therefore, incorporated on the aluminum landing gear pistons in both the main gear and nose gear of the Crusader.

After investigation of various zincate, copper, nickel and

* Lead Engineer, Metallic Coatings Unit, Engineering Structures Materials Group, Chance Vought Aircraft, Inc., Dallas, Texas.

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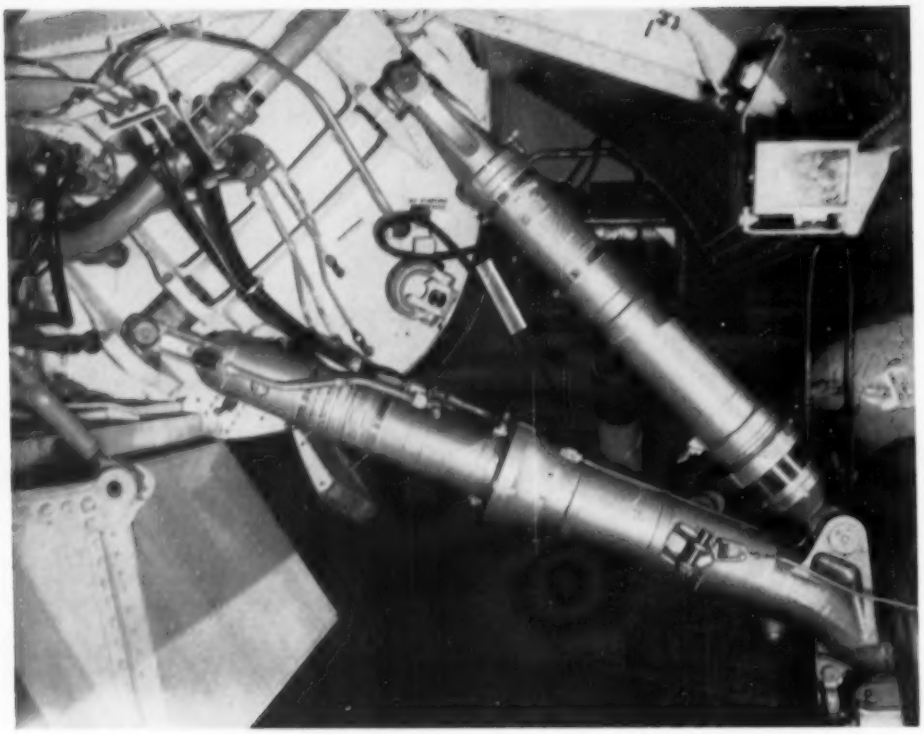


Fig. 1. Nose gear assembly showing section of hard chromium plated piston.

chromium plating solutions used under varying processing techniques, the following procedure was adopted:

1. Preliminary cleaning was accomplished by vapor-spray-vapor degreasing.

2. Alkaline cleaning was performed by immersion of the parts in high quality commercial non-etchant cleaning solution for 5 minutes at a concentration of 6-oz/gal and temperature of 180F.

3. Thorough rinsing was accomplished in running water for a minimum of 2 minutes.

4. Prezincate acid pickle was performed by immersion for 30 seconds in an acid solution of the following composition operated at room temperature:

42° Baume nitric acid	58.5 vol
70% Hydrofluoric acid	17.9 vol
Tap water	23.6 vol

This removed oxide and similar surface contaminants.

5. Thorough rinsing was accomplished in running water for a minimum of 2 minutes.

6. First zincate treatment was performed by immersing the work for 2 minutes at room temperature (78F) in a bath containing 6-oz/gal of a commercial zincating compound.

7. Thorough rinsing was accomplished in running water for a minimum of 2 minutes.

8. Intermediate zincate treatment pickle was accomplished by immersing the work for 1 minute at room temperature (78F) in a solution composed of equal volumes of 42° Baume nitric acid and water. This operation removed the less adherent, more granulated zincate coating obtained from the first zincating operation. Depending upon the aluminum alloy composition, this step is not always necessary; however, in an evaluation of this type all tested alloys must receive the same processing.

9. Thorough rinsing was accomplished in running water for a minimum of 2 minutes.

10. Second zincate treatment was performed by immersing the parts for 10 seconds in a bath containing 8-oz/gal of a commercial zincating compound operated at room temperature (78 F). The zincate film obtained was more tightly adherent, lighter and denser than that obtained from the first zincating treatment.

11. Thorough rinsing was accomplished in running water for a minimum of 2 minutes.

12. Dilute sulfuric acid rinse was performed by immersing the work for 5 seconds in a solution composed of 1 volume of sulfuric acid and 20 volumes of water operated at room temperature. This neutralized the highly alkaline zincate solution remaining on the work.*

13. Thorough rinsing was accomplished in running water for a minimum of 2 minutes.

Up to this point of the pre-plating cycle, all immersion operations were agitated both by movement of the solution and of immersed work.

* Generally speaking this step is necessary for those parts whose configuration makes rinsing difficult.

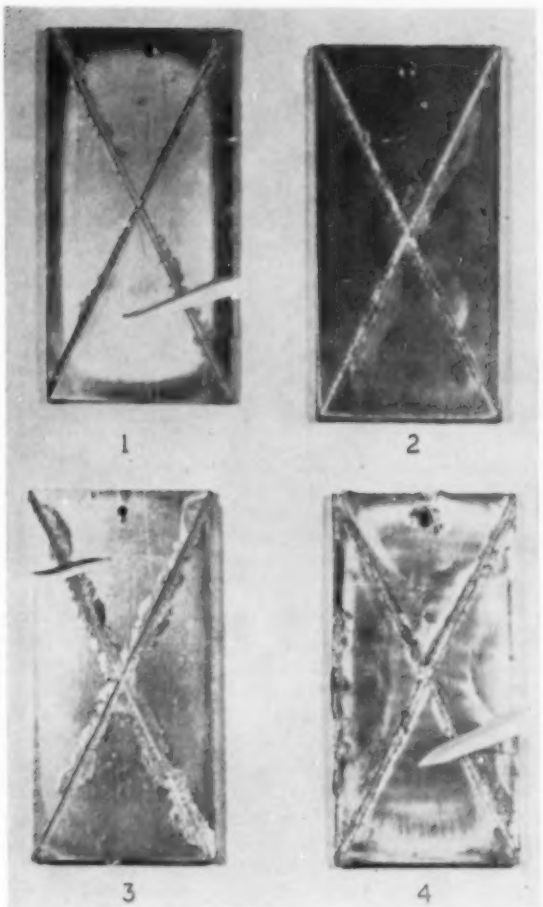


Fig. 2. Panels showing extent of corrosion on milled section after 240 hours salt spray. See key below.
Panel 1. 2024-T4 aluminum, zincate, copper, nickel, and chromium plated.
Panel 2. 7075-T6 aluminum, zincate, copper, nickel, and chromium plated.
Panel 3. 2024-T4 aluminum, zincate, copper, and chromium plated showing extensive corrosion and flaking of plate along groove.
Panel 4. 7075-T6 aluminum, zincate, copper, and chromium plated showing extensive lifting of plate along groove as well as on edges.

14. Copper strike plating was accomplished using the following bath:

Cuprous cyanide	2.6 oz/gal
Sodium cyanide	3.0 oz/gal
Sodium carbonate	3.6 oz/gal
Water (steam distillate) as required	
Temperature	85F
PH	10.2
Current density	15 asf
Voltage	4 v
Coating thickness	0.0002 in.

Where a thicker copper deposit was desired, such as the specimens with chromium directly on the copper, a conventional Rochelle copper bath was used after the low pH copper strike mentioned above.

15. Thorough rinsing was accomplished in first cold then hot running water for a minimum of 2 minutes in each bath.*

* If a delay in the plating sequence occurs at this point (such as a masking operation) the surface of the copper must be reactivated prior to the application of nickel.

TABLE I

Basic Aluminum Alloy	Copper Plate Thickness (Inches)	Nickel Plate Thickness (Inches)	Chromium Plate Thickness (Inches)	Time To Salt Spray Failure (Hours)
2024-T4	0.001	—	0.002	192
2024-T4	0.001	—	0.002	192
2024-T4	0.001	—	0.002	168
7075-T6	0.001	—	0.002	192
7075-T6	0.001	—	0.002	144
7075-T6	0.001	—	0.002	168
2024-T4	0.0002	0.001	0.002	No failure
2024-T4	0.0002	0.001	0.002	at end of
2024-T4	0.0002	0.001	0.002	240 hours
7075-T6	0.0002	0.001	0.002	No failure
7075-T6	0.0002	0.001	0.002	at end of
7075-T6	0.0002	0.001	0.002	240 hours

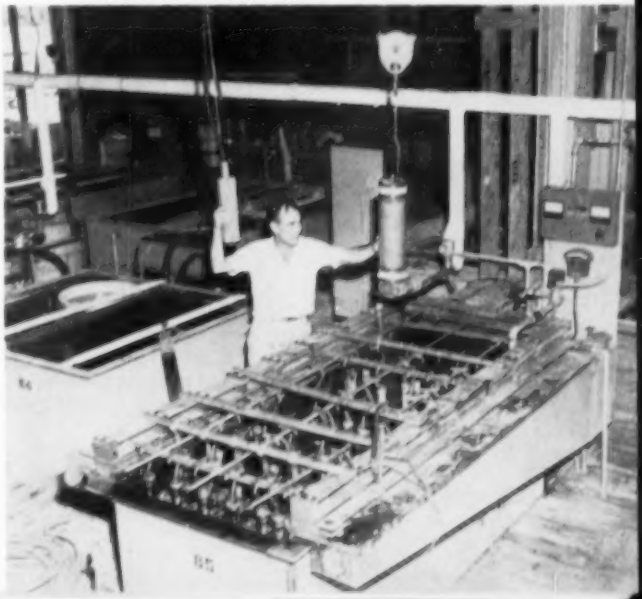
16. Nickel plating was accomplished in a Watts nickel bath of the following composition:

Nickel sulfate	36 oz/gal
Nickel chloride	6 oz/gal
Boric acid	3.6 oz/gal
30% hydrogen peroxide	0.1 oz/gal
Water (distilled)	as required
Temperature	140F
pH	4.3
Current density	40 asf
Voltage	6 v

17. Thorough rinsing was accomplished in running water for a minimum of 2 minutes.*

* If there is a delay at this point in production, the work must be reactivated immediately prior to the chromium plating operation.

Fig. 3. Extensively masked landing gear piston being removed from chromium plating tank.
Photograph courtesy of Menasco Manufacturing Co., Euless, Texas



18. Chromium plating was performed in a self-regulating high speed bath* utilizing the following:

Uniehrome CR-110	2.5 lb/gal
Water (steam distillate) as required	
Temperature	130F
Current density	3 asi
Voltage	6 v

Comparative results of salt spray corrosion tests (Military Specification QQ-M-151A, paragraph 4) as shown in Table I were made on both 7075-T6 and 2024-T4 aluminum panels, Fig. 2. As a result of the improvement shown in these corrosion tests, the zincate, copper, nickel, chromium system is now being employed in those areas where functional chromium plated aluminum components are being utilized in a corrosive environment. The landing gear pistons of this Naval aircraft are such an example. The Chance Vought Crusader encounters both the salt-laden corrosion conditions found at sea and various corrosion conditions on land.

Unlike chromium-plated decorative trim used for eye appeal in many industries, chromium plate is used principally to serve a specific functional purpose in aircraft. Obviously a failure due to corrosion of a chromium-plated functional aircraft component would result in a varying amount of expense and flight delay which could prove quite costly in time of peace and disastrous in military conflict. A typical example of a masked landing gear inner piston is shown (Fig. 3) being removed from the chromium plating tank. The processing area illustrated in Fig. 4 shows a modern plating installation incorporating the zincate, copper, nickel, chromium system for electroplating aluminum alloy landing gear pistons.

The evaluated chromium plating system incorporating nickel is adequately serving the functional purpose and satisfactorily existing in the corrosive environment to which it is being subjected. Buffing, cleaning, and reactivation of the nickel plate immediately prior to the application of the chromium plate increased the corrosion resistance of the coating, but not sufficient to warrant the expense of the additional operations. For the same reason, a thorough evaluation of an anodic coating to replace the zincate coating has not been planned.

A metallographic examination of the focal points of corrosion on the various aluminum panels proved that in all cases of galvanic corrosion on the 7075-T6, the attack was limited

* Uniehrome CR-110.

Fig. 4. General view of plating department devoted to the plating of aluminum landing gear components.
Photograph courtesy of Menasco Manufacturing Co., Euless, Texas

Fig. 5. Photomicrograph taken at base of groove showing existing granular corrosion on zincate, copper, nickel plated 7075-T6 aluminum.

to pitting or transgranular corrosion (Fig. 5). On the 2024-T4 alloy, the attack was intergranular, Fig. 6, varying from moderate to severe.

Theoretically, the two types of corrosion on these alloys is due to the differences of potential between the grain structure of the metal and the grain boundary in the existing environment. The potential difference will vary depending upon alloy and "T" condition. The intergranular attack was considerably slower than the pitting transgranular attack which accounts partially for the 2024-T4 aluminum alloy resisting corrosion better than similar treated and tested 7075-T6 at the interface of the plate and exposed aluminum (Fig. 7). In some cases the zincate, copper, nickel plate has been undermined as much as 0.50 inch back from the groove on the 7075-T6 aluminum. Although intergranular corrosion is occurring in the exposed groove of the 2024-T4 aluminum alloy, no noticeable amount of undermining of the plate is detected.

Past experience with the zincate, copper, chromium system on landing gear components proved this system inadequate to prevent corrosion in prolonged service. The importance of obtaining a hard, corrosion-resistant chromium plate on aircraft landing gear pistons as used on the Crusader must be emphasized. A corrosion condition on landing gear pistons, if allowed to progress to the point where a flaking of

Fig. 6. Photomicrograph taken at base of groove showing existing intergranular corrosion on zincate, copper, nickel plated 2024-T4 aluminum.

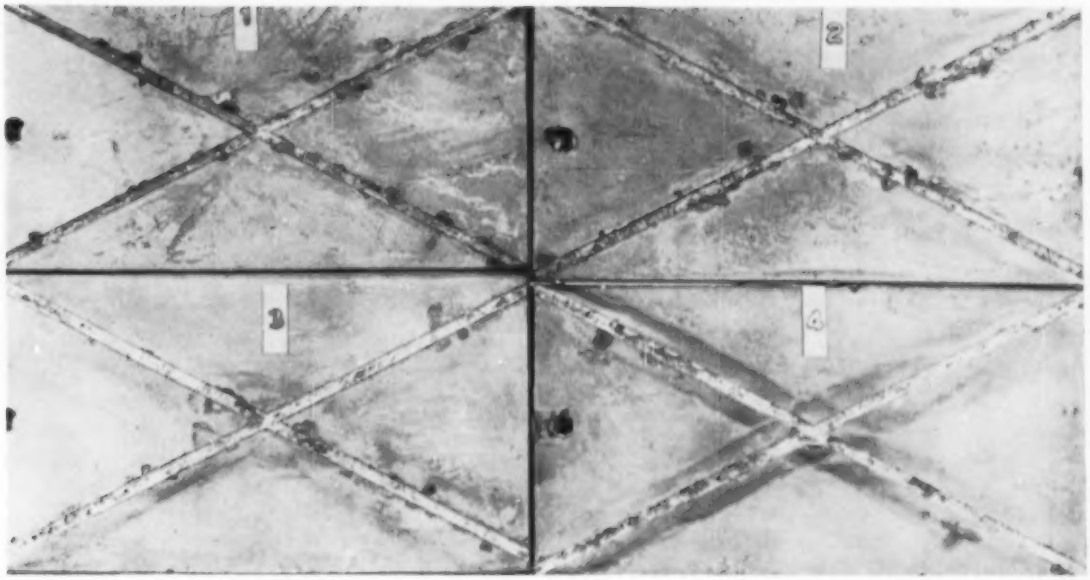


Fig. 7. Extent of corrosion on milled section of plated panels after 240 hours in salt spray. Key: Panels 1 and 2. 2024-T4 aluminum, zincate, copper, nickel plated. Panels 3 and 4. 7075-T6 aluminum, zincate, copper, nickel plated.

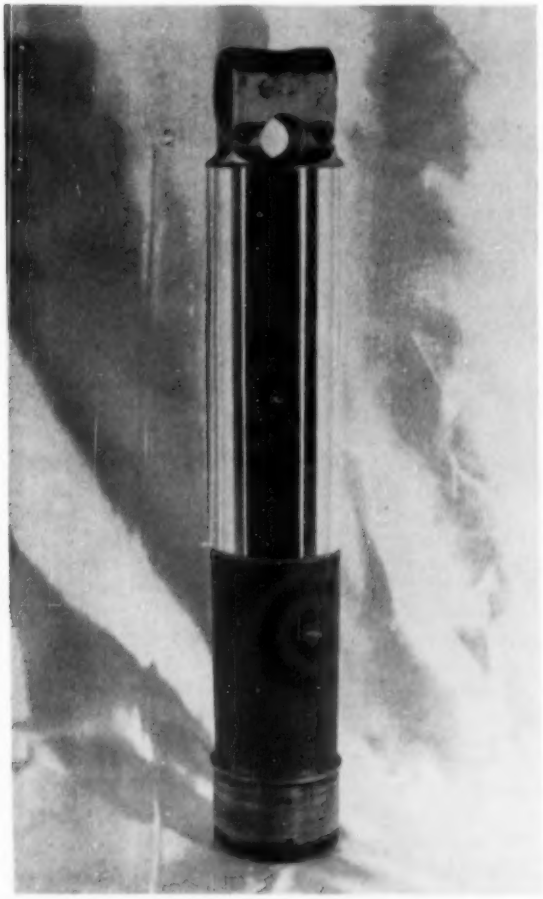


Fig. 8. Aluminum main landing gear piston showing hard chromium plated bearing surface.

the chromium plate occurred, could result in a scoring of the cylinder walls and failure of the "O" ring. This would cause leakage and possible binding which could result in a malfunction of the landing gear. A typical example of the extent to which chromium plate is being employed on landing gear pistons may be seen in Fig. 8. No indications of corrosion have been reported on the chromium-plated landing gear pistons of the Chance Vought F8U-1 Crusader.

William L. Aves Jr. joined Chance Vought Aircraft, Inc., Dallas, Texas, in March, 1956. His position is that of Lead Engineer in charge of the Metallic Coatings Unit for the Engineering Structures Materials Group. Prior to his present affiliation, he was Assistant Chief Metallurgist at Wagner Electric Corporation in St. Louis, Missouri, for 11 years. He also served as technical advisor to their Metal Finishing Department.

Mr. Aves was born in Houston, Texas, lived as a youth in Mexico, attended high school at Texas Military Institute, and majored in Metallurgical Engineering at Missouri School of Mines and Metallurgy. He is a member of the Dallas-Fort Worth Branches of AES, ASM, and SAMPE (Society of Aircraft Manufacturing Process Engineers). Recently he competently instructed a 30-hour course in metal finishing to Chance Vought production employes.

LEAD-TIN ALLOY PLATING FOR AIRCRAFT ENGINE COMPONENTS

by JOSEPH AZZOLINO*

INTRODUCTION

SINCE 1951, LEAD-TIN ALLOY deposits have completely replaced lead-indium as an overlay on bearing surfaces of Curtiss-Wright aircraft engines. This change has resulted in the improved service life of bearings under present-day high-power operating conditions.

The major considerations in substituting the lead-tin alloy for the lead-indium diffused coating included the greater corrosion resistance of the lead-tin, its ease of application, and the uniformity of the deposit.

The lead-indium deposit is a diffusion coating which includes the following operations:

(1) lead plate,
(2) indium plate,
(3) diffuse in hot oil.

Compared to this, the lead-tin is co-deposited from a single electrolyte.

Characteristic of diffusion coatings, the lead-indium deposit consists of three distinct zones:

(1) an outer indium-rich zone
(2) a lead-indium diffusion zone
(3) a lead-rich zone adjacent to the bearing material.

The lead-tin co-deposit, on the other hand, is a uniform layer.

During engine operation, the relatively thin indium-rich and lead-indium layers wear away leaving the lead-rich layer. Although lead is an excellent "break-in" material, it reacts with the partial oxidation products of engine oils to form soaps with subsequent removal of the lead from the surface. This condition is highly undesirable and leads to bearing failure.

The lead-tin deposit, while retaining the favorable "break-in" characteristics of the lead, resists the soap formation.

CONTROL

The composition of the electrodeposit is quite critical and must be maintained within 6.0-9.5 per cent tin, the remainder lead.

At concentrations above 9.5 per cent, the eutectic point is approached and the melting point lowered. This can result in early engine failure due to washing out of the overlay and seizing in highly loaded applications, such as the connecting rod bearing of a reciprocating engine.

At concentrations below 6.0 per cent, the corrosion resistance to hot lubricating oils is decreased.

In order to control the composition of the deposit, the bath must be prepared and carefully maintained as described in Table 1.

Standard methods of analysis are available for all bath constituents except the addition agent, peptone.

In order to maintain the solution within the prescribed operating limits, it is necessary to analyze the solution and deposited alloy, calculate the required additions, and make subsequent adjustments.

If the $\frac{\text{calculated addition of lead fluoborate (mls)}}{\text{calculated addition of tin fluoborate (mls)}} \geq 8$

and the alloy deposit contains 7.75 to 9.5 per cent tin, then the calculated additions are made.

If the $\frac{\text{calculated addition of lead fluoborate (mls)}}{\text{calculated addition of tin fluoborate (mls)}} \geq 8$

and the alloy deposit contains 6.0 to 7.75 per cent tin, then the calculated additions are made. Also, an addition of peptone is made as follows:

TABLE 1

Bath Composition		
Boric acid	11.0 g/l	(1.47 oz/gal)
Lead fluoborate	175.7 ml/l	(22.6 fl. oz/gal)
Fluoboric acid (42%)	118.1 ml/l	(15.2 fl. oz/gal)
Peptone	2.0 g/l	(0.26 oz/gal)
Tin fluoborate	21.4 g/l	(2.75 fl. oz/gal)
Maintain		
Stannous tin	3.75-9.0 g/l	(0.5-1.2 oz/gal)
Lead metal	60.0-105.0 g/l	(8.0-15.0 oz/gal)
Free fluoboric acid	37.5-75.0 g/l	(5.0-10.0 oz/gal)
*p*H	0.5 max	
Peptone	as required	
Operating Conditions		
Temperature	room	
Agitation	none required	
Current density	30 asf	
Anode to Cathode Ratio	external plating 2:1	
	internal plating 1:3	
Frequency of Analysis*		
Lead metal	weekly	
Stannous tin	three times weekly	
Deposited alloy	twice weekly	
Free fluoboric acid	weekly	

* This represents a bath which is used 24 hours/day, 5 days/week.

* Curtiss-Wright Corporation, Wright Aeronautical Division, Wood-Ridge, New Jersey.

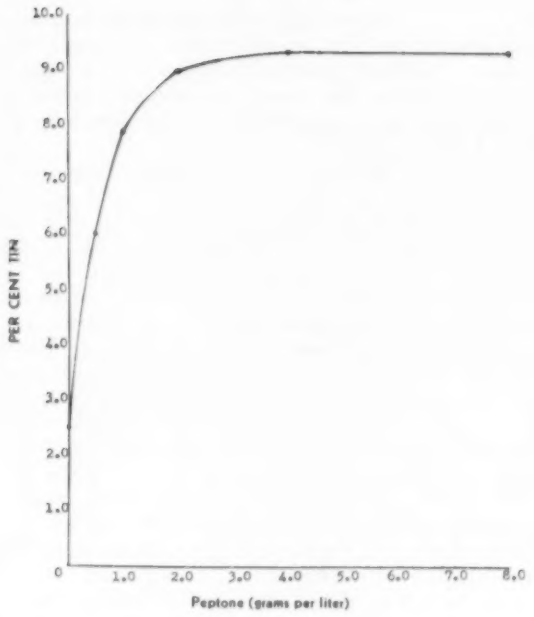


Fig. 1. Peptone concentration vs tin content of lead-tin alloy.

Per cent Tin in Alloy	Peptone Addition
6.0 — 6.5	0.3 g/gal times tank capacity (gal)
6.5 — 7.0	0.2 " " " " " "
7.0 — 7.75	0.1 " " " " " "

$$\text{If the } \frac{\text{calculated addition of lead fluoborate (mls)}}{\text{calculated addition of tin fluoborate (mls)}} < 8$$

and the alloy deposit contains 7.75 to 9.5 per cent tin, then the calculated lead fluoborate addition is made and the tin fluoborate addition is reduced to 12 per cent (1-8) of the lead fluoborate addition.

$$\text{If the } \frac{\text{calculated addition of lead fluoborate (mls)}}{\text{calculated addition of tin fluoborate (mls)}} < 8$$

and the alloy deposit contains 6.0 to 7.75 per cent tin, then the calculated additions are made.

This method of adjustment has provided a trouble-free operation since its introduction two years ago.

PROCEDURES

Since lead-tin is used specifically as an overlay deposit for bearings, the surfaces to be plated are limited to the common bearing materials, such as: silver, silver alloys and copper base alloys, all with steel backing.

The following procedures are used and are specific for operations involving plating of bearing surfaces only on fixtures designed for that purpose:

For silver and silver alloys

Demagnetize
Degrease
Immerse in hot soap solution for 5-10 min.
Warm water rinse
Cathodic clean (15-30 sec.)
Cold water rinse
Pumice scrub with a soft bristle brush
Cold water rinse
Install on fixture
Plate
Cold water rinse
Remove from fixture
Cold water rinse
Soluble oil slush
Corrosion preventive oil slush

For copper base alloys

Degrease
Demagnetize
Immerse in hot soap solution for 5-10 min.
Warm water rinse
Immerse in 10 per cent ammonium persulfate for 1-2 min.
Cold water rinse

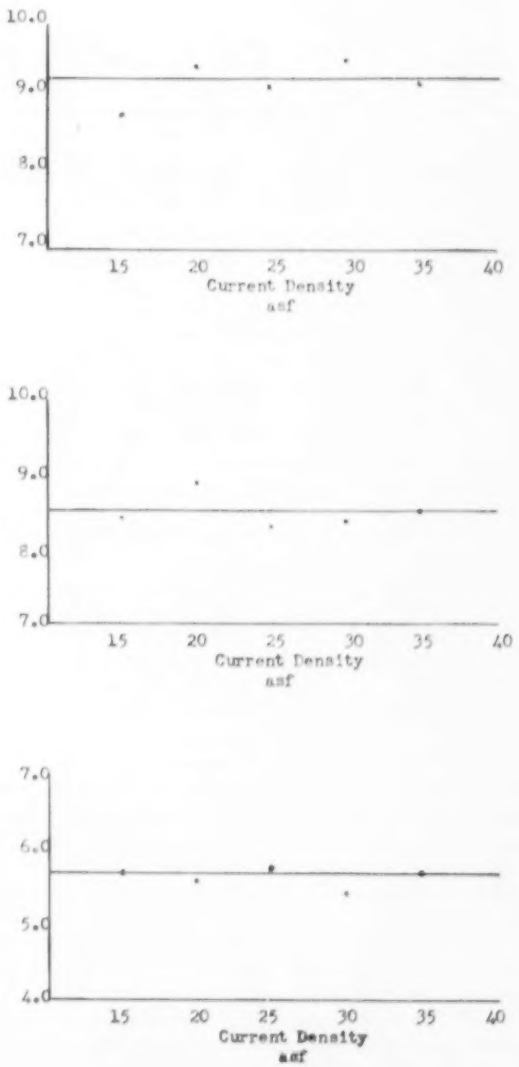
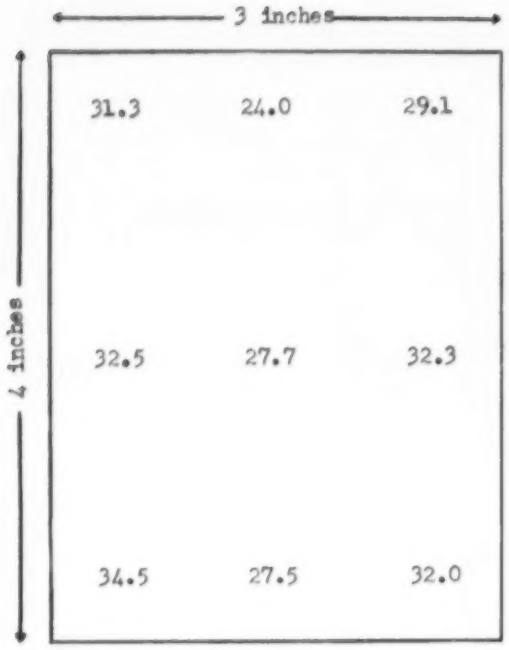


Fig. 2. Tin concentration vs current density



Numbers indicate the average current density (asf) within that area.

Fig. 3. Current distribution for lead-tin plating.

Pumice scrub with a soft bristle brush
Cold water rinse
Install on fixture
Plate
Cold water rinse
Remove from fixture
Cold water rinse
Soluble oil slush
Corrosion preventive oil slush

FACTORS INFLUENCING THE TIN CONTENT OF LEAD-TIN DEPOSIT

The main factors influencing the composition of the deposit are:

Stannous tin
Addition agent (peptone)
Type and composition of anodes

Since the solution contains a high concentration of lead metal (8.0 — 15.0 oz/gal), a slight variation in its concentration has little effect on the composition of the deposit.

The stannous tin should be maintained within 0.6 — 0.95 oz/gal for optimum operation of the bath. From the maintenance schedule, Table I, it is apparent that deposits within the required composition are obtainable within the range of 0.5 — 1.2 oz/gal, provided that the peptone concentration is adjusted accordingly as previously discussed.

In order to maintain the tin in the deposit within the required limits, when the stannous tin approaches the upper limit of the range, the peptone addition should be decreased; as the stannous tin is depressed to the lower limit, the peptone content should be increased. The relationship between peptone concentration and the alloy composition is shown in Fig. 1 and indicates that the amount of peptone present in the bath has a pronounced effect on the tin content of the deposit within the specification range. In addition, the peptone content should never fall below 0.5 g/l since rough deposits result.

Care must be taken to use proper anodes. Single circuit alloy anodes are most desirable. Anodes containing a tin value which falls outside the required range (6.0 — 9.5 per cent) will alter the metal concentration within the solution and in turn alter the composition of the alloy deposit. This effect is most pronounced when the tin value of the anode is significantly above the upper limit of the specification.

Impurities within the anodes, e. g. antimony, magnesium, will result in improper anode corrosion. Polarization occurs and a loosely adherent black smut is produced on the surface of the anode. The film disintegrates and tiny black particles fall into and contaminate the plating solution with a subsequent rough deposit on the work.

It has been reported that current densities below 30 amp/sq ft affect the tin content of a lead-tin alloy deposit.[1]

Data obtained by the author on the bath discussed here indicated that current density had no significant effect on the tin content of the deposit. This laboratory work was performed at current densities of 15 to 35 asf in a tin range of 7.5 ± 2.5 per cent.

During the plating of test panels, three separate baths were selected and adjusted to produce maximum, minimum and intermediate values within the 5 to 10 per cent tin range. The data produced curves which were essentially straight line functions throughout the entire range. See Fig. 2.

This led to a subsequent investigation to determine the current density distribution over a given surface. A Belke-Kotz current density meter was used with a 3 by 4 inch test panel.

The results indicated a mild variation in current density over the panel. See Fig. 3. However, the magnitude of the variation is such that no difficulty from this source may be expected as has been shown by production experience when plating within a current density range of 15 to 35 asf.

ACKNOWLEDGMENT

The author wishes to express his gratitude for the help received from many people in the Wright Aeronautical Division of Curtiss Wright Corporation in gathering the data reported in this paper. Special acknowledgment is made to I. Friedman and B. E. Scott for their assistance.

REFERENCE

[1]Metal Finishing Guidebook, Lead Tin Alloy Plating, A. E. Carlson and C. Struyk, pp. 309 (1953).

Joseph Azzolino graduated from Fairleigh Dickinson College in 1953 with a BS in chemistry. He joined the Wright Aeronautical Division of Curtiss-Wright Corporation prior to that time as an analytical technician and in 1953 became a control chemist in the Plating and Surface Treatments Group. Since that time his activities have been directed toward process and material evaluation, trouble shooting and vendor approvals. He is a member of the Newark Branch of the AES.

THE VITAL ROLE OF PLATING AND PICKLING TECHNIQUES IN THE AIRCRAFT INDUSTRY

by SAM A. LONG*

INTRODUCTION

THE RAPID DEVELOPMENT of range and speed of aircraft during the past five years has placed heavy demands upon those responsible for the choice of materials of construction. Engineering is utilizing recently developed alloys of ferrous and nonferrous materials and is employing plating procedures in an effort to meet current rigid specification requirements. This symbiotic situation has its effects upon plating and processing efforts. It is in this area that economies and weight savings can be realized through proper production methods with accurate and precise methods of control. While facilities may be provided for the constant evaluation and development of pickling, cleaning, and plating techniques, it cannot be emphasized too strongly that any successful engineering application in the field of pickling and plating involves the concerted and constant efforts of the chemists, metallurgists and platers.

PLATING

The complex and critical aspects of aeronautical design have changed the objectives and techniques of plating. In the past, a coating was generally deposited upon the surface of a material for the purpose of imparting a nonrusting, bright finish to the article. The objectives were primarily rust protection and eye appeal. Today, plating is a functional unit operation. It assumes the role of a primary material of construction in much the same manner as stainless steel, aluminum or titanium. In fact, the metallurgist regards electrodeposition as a cold-casting process. It is a versatile way to bring about many variations of desired physical properties for special applications. It depends on proper control of specified conditions in the plating process.

This current concept of plating has broadened the thinking of design and materials engineers by providing new avenues of approach to the solution of many problems associated with advance design considerations. Weight to thrust ratio is a critical factor in aircra't and missile design. It involves, among other things, the efficient utilization of space for housing required component parts. The technique of miniaturizing and automatic assembling of electronic components and circuits revolutionized the field of electronics in aviation. The techniques were largely based on advances in making electrolytic copper foil and plating conductive materials onto plastics and ceramics. The use of printed circuits has increased the efficiency of electronic circuits in addition to a more realistic utilization of space and weight distribution. In this area also it might be mentioned that the tin plating of copper wires has removed in a great measure the soldering problems inherent with copper wires. The gold plating of wires fabricated from certain alloys has in some cases made possible the design of relays and connectors that may be used interchangeably in high and low capacity circuits. The silver and nickel plating of copper wires has increased the temperature range over which electronic circuits could safely operate.

The dimensional specifications required for some components are in many cases next to impossible to satisfy with the use of ordinary machining devices. Such tolerances are met currently by electrodeposition. This operation not only requires careful and rigid control of plating solutions and conditions but entails the special design of anodes to fit the complex geometric design of the component part so that a uniform deposition of materials with specified thickness can be obtained.

In addition to environmental corrosion of component parts, the design and materials engineer is confronted with corrosion caused by certain fuels. A fuel may be provided that will meet the requirements of thrust specifications but an investigation shows that only certain materials can resist the corrosive action of the fuel. These materials possess properties such that if used, a weakening of structure would result or the resultant weight would be too great or some other related specification requirement could not be satisfied. Plating research has provided the solution to some of these problems. A metal inert in the liquid or vapor phase of the fuel is electrodeposited upon the surface of the material of construction that meets the specification requirements in all cases except corrosion resistance. For example, critical orifice dimensions of devices metering corrosive liquids at

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high velocity have been maintained by deposition of hard chromium.

Certain heat exchanger designs have been improved significantly with the aid of metallic plating. In actual operation some types of heat exchangers have either functioned at low efficiency or failed altogether during peak performance operation. The basic materials of construction of these exchangers could not be changed because of other major considerations. An electometallic deposit on critical surfaces of these heat exchangers provided the solution to the problem and resulted in a quality component with a high degree of reliability. Properly designed thiefs and other rigid controls were necessary in order to effect the desired result.

It is sometimes more economical to heat treat an assembled unit, providing the unit can be disassembled for subsequent operations. The silver plating of bolted assemblies proved to be a successful operation in that the components after heat treatment were easily disassembled with no thread shearing.

The heat generated by friction of high velocity aircraft has created problems in creep and stress of the materials of construction. The metallurgical engineer is continuously seeking new ways and means of developing alloys that have the necessary mechanical properties to function properly at the high temperature encountered. Plating research is progressing along the same lines in an effort to develop the processes and techniques that may be used to provide ways and means of utilizing these alloys to maximum advantage. Molybdenum for example is known to have excellent mechanical properties at high temperature but oxidizes rapidly under high temperature conditions. Alternate layers of electrodeposited gold, chromium and nickel retard the oxidation of molybdenum at high temperatures.

A brief description of a few of the plating processes at Bell Aircraft is presented in the following sections. A summary of some of the applications of plating and pickling baths and their chemical control is shown in tabular form. It will be noted that polarographic methods are in use. Research is presently being conducted on a wider use of the polarograph in this area because of the speed and accuracy of this instrument when properly used.

Copper Plating

The conventional cyanide bath is utilized for copper plating. In addition to plating for carburizing and nitriding, heavy deposits of copper are made in the production of certain heat exchanger components. In order to accomplish these jobs, the bath is fitted with an accurate constant temperature control system in addition to automatic agitation and constant filtration. In some cases, only selected areas are carburized or nitrided. For example, previously cleaned gears are mounted on an adjustable fixture and rotated while immersed to a predetermined depth in a molten wax bath. The gears are then copper plated, the plate being deposited upon those areas not covered with wax. After the wax is stripped from the gears, only those areas that are not copper plated become carburized or nitrided. Quality control of the copper deposit is maintained by standard ferroxyl test. After carburizing and nitriding, the copper is stripped electrolytically in a caustic-cyanide bath solution. The control of the carbonate content of the strip bath is of utmost importance. Recent investigation of the cause of gear pitting has shown that polarization will take place if the carbonate content of the solution is over two ounces per gallon. No recurrence

SOME APPLICATIONS OF PICKLING AND PLATING BATHS WITH CONTROL METHODS

Plate	Pickle Bath	Bath Type	Engineering Application	Analytical Determination	Control Method	Frequency Per Week
Chromium	—	SRHS (1)	Corrosion resistance; build up; worn or inaccurately machined parts to tolerance.	specific gravity	—	3
Nickel	—	watts	Preplate; decorative	pH nickel sulfate chloride	pH meter gravimetric gravimetric gravimetric	1
Copper	—	cyanide	Stop-off for nitriding and carburizing. Preplate for decorative plating.	copper cyanide carbonate	polarographic volumetric volumetric	1
Cadmium	—	cyanide	Corrosion resistance, atmospheric and galvanic.	cadmium cyanide carbonates brightener	polarographic volumetric volumetric hull cell	1
Silver	—	cyanide	Anti-seizing purposes — electrical components.	silver cyanide	gravimetric volumetric	1
	hydrochloric sulfuric nitric hydrofluoric acid	—	Removal of heat treat scale, die pick-up, welding and cutting of stainless steels.	acid and metal content.	ion exchange and volumetric methods.	

(1) Self-regulating high-speed chromium plating.

of this phenomenon has been observed since the carbonate content was placed under strict control.

Cadmium Plating

A high cyanide concentration bath with a cadmium to cyanide ratio of 3.9 to 4.0 is used. While the primary purpose of cadmium deposition is for corrosive protection from out-of-doors exposure, it is also utilized for protection against galvanic corrosion resulting from the coupling of dissimilar metals. Flares of stainless steel tubing and steel components intended for coupling with aluminum parts are plated, in some cases, to a thickness of the order of 0.001 to 0.0015 in. As in the case of copper plating, the cadmium baths are rigidly controlled in solution composition and are provided with automatic agitation and filtration devices.

Silver Plating

The objectives of silver plating are generally for electrical, antigalling and antifriction purposes. As previously described, plated bolted assemblies that have been heat treated were easily disassembled with no thread shearing. Extreme caution should be exercised in the use of silvered bolts, however. Consideration should be given to the type of metal used in conjunction with the bolt, and if an electrolyte is present, the solution potential of the two metals. Otherwise, disastrous results may occur.

Chromium Plating

A self-regulating high speed plating bath is utilized for providing abrasive resistance, the build-up of mismachine, or worn parts and corrosion resistance. After the deposition of chromium plate, it is vitally important to bake the surface wherever applicable to relieve subsequent hydrogen embrittlement.

PICKLING TECHNIQUES

Control of the variety of pickling and cleaning solutions required is of paramount importance. The broad variety of alloys in use has resulted in fabrication techniques which in some cases have a tendency to introduce impurities into the surface of the metal. Some common impurities encountered are sulfur from cutting oils, burnt lubricants and rubber; lead and zinc from forming dies. Such adulteration can impair the corrosion resistance of the alloy and may lead to cracking in heat treatment or welding. Good housekeeping practices as well as proper utilization of cleaning procedure is essential to quality production.

Corrosion Resistant Materials

Parts fabricated from corrosion resistant alloys, where applicable, are degreased, alkali cleaned and pickled in a solution of 30 per cent by volume nitric acid (70 per cent concentrated acid) and 3 per cent by volume hydrofluoric acid (52 per cent hydrofluoric acid) at 120 to 130F. Exception to this is Type 303FM, machined Type 300 series and 400 series stainless steels. Experience has shown that machining Type 300 series stainless steel results in a sensitized surface. In these cases such a pickling solution can produce severe pitting with possible subsequent scraping of material.

All machined Types 300 and 400 series stainless steel should be pickled in a 40 per cent by volume nitric acid (70 per cent concentrated acid) and 0.2 per cent by volume hydrofluoric acid (52 per cent hydrofluoric acid) bath. During pickling operations the baths should be air agitated to prevent concentration cell corrosion. This treatment may also be applied for the removal of die pickup, scale removal after heat treatment and after stainless steel welding and cutting operations.

Aluminum Alloys

If parts fabricated from aluminum alloys are degreased in a chlorinated hydrocarbon they should be subsequently cleaned in an inhibited alkaline cleaner followed by immersion in a 10 per cent by weight chromic acid solution. Wherever applicable, aluminum alloys should be anodized in a chromic acid bath. Deviation from this procedure is made if the aluminum contains lead die pickup. In this case, the alloys are alkali cleaned after immersion in the chromic acid dip. The chromic acid forms a lead chromate salt which is soluble in the alkaline cleaner. After welding operations, neutralization of the residual welding flux is accomplished by immersion in a sulfuric acid-chrome acid bath. Experience has shown that if 6061ST alloy is processed frequently through sulfuric acid alone, a faint pink copper cast forms on the surface. The addition of chromic acid to the bath serves to remove the surface smut and copper cast formations.

Titanium and Other Alloys

Titanium alloys are descaled in Virgo salts and pickled in a nitric-hydrofluoric acid bath at room temperature. In the case of other alloys, the choice of cycle is dependent upon the resistance of the base metal to the pickling solution.

ACKNOWLEDGMENT

The author wishes to express his appreciation to Louis Ross, foreman of the Plating and Finishing Department, and to William Bergdorf of the Chemical Laboratory, Bell Aircraft Corporation for their comments and suggestions.

Sam A. Long has been employed by Bell Aircraft Corporation since 1937. He assumed his present responsibilities as chief chemist in 1940. His interest and duties have covered a wide field of scientific study including the development of special analytical procedures some of which have recently been published. He was instrumental in correcting certain aspects of the first jet fuel, served as consultant in shop problems involving electroplating, waste disposal and pickling, and served as project engineer on USAF contracts involving studies in corrosion and corrosion inhibitors. He is an active member in the American Society of Metals, American Rocket Society and INCO Sea Horse Institute.

DIMENSIONAL ETCHING

It's Application to Airframes

by **RICHARD H. ANDREW and JACQUE L. DUVALL***

Etching metals to precise dimensions has evolved from its earlier applications into a practical tool for the production of complex airframe designs.

With removal of the limitations imposed on designers by conventional machining methods, structural patterns to strengthen and lighten airframes are now possible which previously required extremely difficult and costly techniques.

Chemical etching is applicable to the common alloys of airframe construction, such as those of aluminum, magnesium, titanium and stainless steels, and may be extended to ceramics. This process mainly consists of cleaning, masking with a chemically resistant coating, scribing, etching the design, and the finishing operations.

Overall dimensional reduction and integral stiffening of skin sections typify applications of the process.

Adaptation of mass production methods to chemical etching is hampered by the masking procedures which require hand labor. However, this limitation can be removed by the development of adequate photosensitive masking techniques or others to which automation is applicable.

ETCHING OF METALS TO DIMENSIONAL TOLERANCES by chemical rather than mechanical means is called by many descriptive names. Specific processes for the various metals utilize similar chemical reactions to etch structural designs on a production line basis.

*Wyandotte Chemicals Corporation, Los Nietos, California.

Etching by chemical means has been practiced for many generations as a tool of the artisan to produce decorative and useful designs in metals. In ancient times, works of art were etched on medieval armor, and more recently, precise applications of this tool have brought modern lithography and engraving to a high state of perfection.

Modern techniques of masking and etching are based on

Fig. 1—Titanium etching—(Upper Left) Etched samples of titanium alloy. (Upper Right) Testing for hydrogen pick-up by a titanium alloy during etching at Convair, San Diego, California. (Lower Left) A titanium door panel. (Lower Right) Hydrogen analyzer apparatus.

the work of such pioneers as Ludwig Gmach[1], who revealed a method in 1938 for etching designs in aluminum using a photosensitive maskant. Brennan and Marsh[2] utilized a dichromated albumin maskant in producing very deep etches in metal printing plates. Kohichi Sase[3] devised a method in 1948 for making deep step etches in metals using various maskants. Between 1949 and 1953 many patents[4] were issued to primary producers of aluminum and magnesium in the United States, describing etch solutions and techniques of achieving controlled dimensional change in a chemical bath. A North American Aviation, Inc.[5] process patented in 1956 introduced this tool to the aircraft industry as a means of etching complex design patterns on formed airframe components. Modification of earlier techniques by North American Aviation, Inc. produced a novel application of the art of dimensional etching, which is an invaluable tool to the industry.

Process

The basic process used by the aircraft industry consists of cleaning, masking and scribing, etching, and finishing. Dimensional etching is most commonly applied to aluminum and magnesium alloys; however, etching of titanium and stainless steels is becoming increasingly prevalent.

Titanium and aluminum parts in process are shown in Figures 1 and 2.

Cleaning

The cleaning procedure involves removal of residual oils and shop soils by an alkaline cleaner. Where heavy greases and other such soils are present, vapor degreasing with trichlorethylene prior to alkaline cleaning is frequently advantageous.

Included in cleaning procedures is deoxidizing or pre-etching to improve surface uniformity and maskant adhesion. Lack of adequate maskant adhesion will cause abnormal etching. Aluminum and magnesium may be deoxidized or pre-etched with any of several proprietary compounds.

Masking and Scribing

The maskant functions as a barrier to the etchant media, and is applied by dipping, brushing or spraying. After suitable curing, a template of the design to be etched is placed over the part and the design is scribed through the maskant. Those areas to be etched are then stripped free of masking.

Maskants differ in formulation depending upon the nature of the etching bath in which they are to be used. Manufacturer's recommendations should be followed as to appropriate type and handling technique. Neoprene, vinyl, and vinyl modified neoprene based maskants are most commonly used. Lead and plastic tapes find use as stop-offs for small areas and inspection cuts.

The use of photosensitive maskants holds much promise as an improvement over present techniques.

Etching

Etching is performed in a chemical bath of a suitable composition which is mechanically or preferably air agitated to

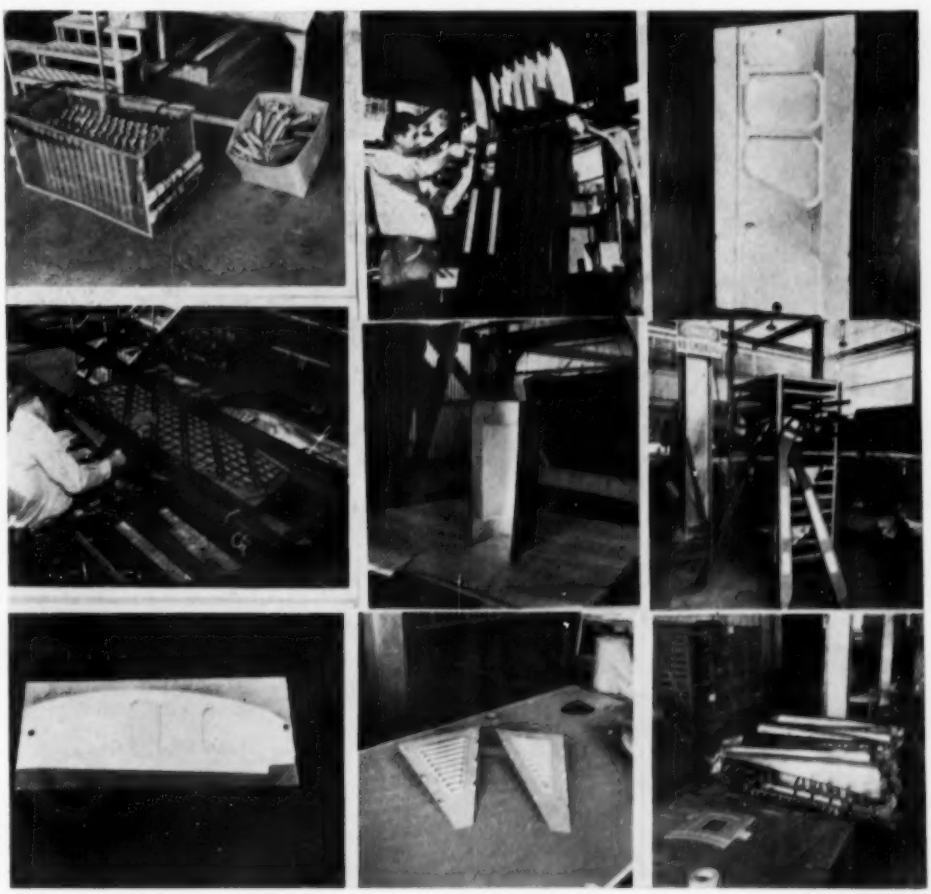

Fig. 2—Parts in process— (Upper Left) Showing a production basket with tubes to be reduced. (Upper Center) Showing methods of fasting parts. (Upper Right) A magnesium part. (Middle Left) Preparing a wing tip for the next step-etch. (Middle Center) Curved part. (Middle Right) Parts ready to be etched. (Lower Left) Aluminum part. (Lower Center) Parts showing different etching steps. (Lower Right) Parts ready for final inspection.

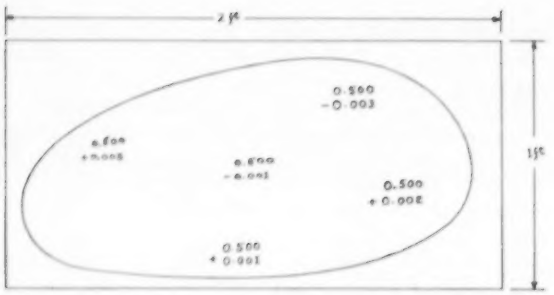

Fig. 3. Tolerances which can be achieved with aluminum. Limits for magnesium, titanium, and stainless steel approximate: ± 0.002, ± 0.003, ± 0.001 respectively.

facilitate temperature control, carry away reaction by-products, and to avoid depletion of the bath at the metal surface.

Parts are either periodically removed to observe the progress of the etch, or are controlled by an electronic device which automatically removes the part when the desired depth of etch is reached.

The function of the etchant is to remove uniformly the exposed metal to precise dimensional tolerances. The etch rate is a function of composition and temperature, and is generally designed to remove approximately 1.0 mils (0.001 in.) of metal per minute: This permits holding the depth of etch to close tolerances. (Fig. 3). Excessively high etch rates would produce tapering of parts on immersion and withdrawal from the bath. Where this does occur, tapering may be nullified by withdrawing the part midway in the etch cycle and rotating 180 degrees.

In addition, an etchant must produce a surface finish consistent with requirements for maximum fatigue strength. Superficial surface appearance is of little structural importance; whereas, quality of the surface texture is of primary concern. Surface texture, as expressed by the root mean square (RMS) of the surface profile (Fig. 4), is affected by the grain size and elemental composition of the metal alloy. The etchant must be properly composed and controlled to compensate for the adverse effects, which can result from electrochemical interaction between the solution and the various components of the alloy.

Lateral etching under the maskant edge proceeds at approximately the same rate as the vertical etch. The ratio of lateral to vertical etch is defined as the etch factor (Fig. 5). Etch factors must be determined for a specific etchant and operating procedure. Once these etch factors are known proper tooling can be made to produce the design to fine tolerances.

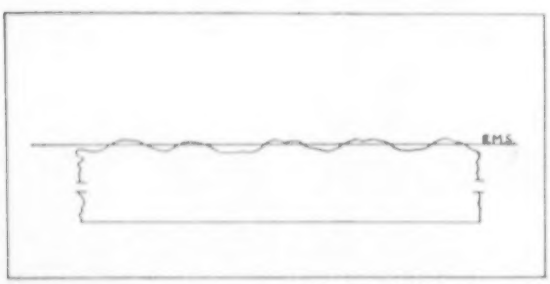

Fig. 4. RMS line showing root mean square of etched metal surface profile. The value is usually expressed in micro-inches and determined by a Profileometer.

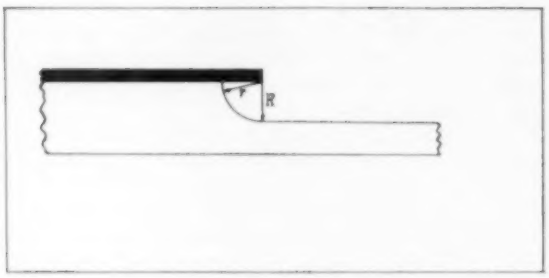

Fig. 5. r/R = etch factor. Ideally, the etch factor is equal to one.

Uniformity of etch is principally the responsibility of the etchant, but outside influences such as the heat transfer properties of the metal occasionally exert an effect. Heat effects can be seen when magnesium is etched in a solution of sulfuric acid, particularly along the boundary between masked and unmasked areas of the metal. In this instance, excessive heating will occur in the immediate vicinity of the boundary accelerating the reaction rate at that point. This results in a deep ditching effect (Fig. 6). By appropriately buffering the solution and by use of specific wetting agents, such abnormalities are eliminated. When a satisfactory etchant is

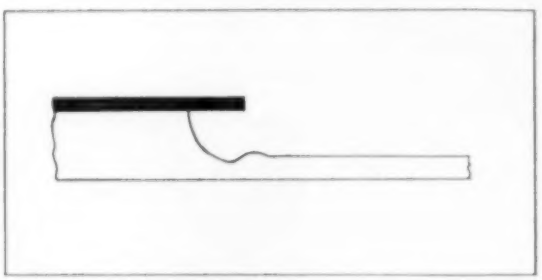

Fig. 6. Ditching along the fillet in magnesium from localized heating.

used, the form along this boundary is that of two mutually perpendicular sides joined by a smooth fillet of uniform radius (Fig. 7).

Rejuvenation of the etchant bath must be practiced regularly to maintain solution balance and avoid excessive by-product accumulation. There are several rejuvenation procedures such as decanting and make-up, filtering and addition of fresh etchant, precipitation and decanting followed by make-up.

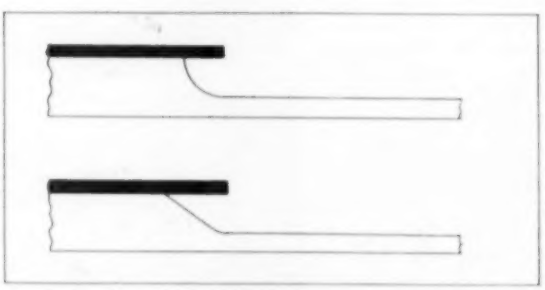

Fig. 7. The two common types of fillets that can be produced. Above, a normal circular radius and below, a bevel. The former is ideal for heavy integral stiffeners, the latter for thin skin sections.

Fig. 8—Finished parts in the line—(Upper Left) Etched parts. (Upper Center) Etched parts ready for final inspection. (Upper Right) Door panel assembly. (Middle Left) Etched parts. (Middle Center) Etched parts ready for final inspection. (Middle Right) Etched wing tip. (Lower Left) Etched parts. (Lower Center) Etched parts ready for final inspection. (Lower Right) Etched wing tip.

Finishing

After final etching, it may be necessary to remove the by-products of the reaction from certain alloys prior to inspection. This is easily accomplished in a selected deoxidizer, which solubilizes the by-products without altering the dimensional tolerances already established.

Following a rinse, the etched part is stripped of maskant either manually or by immersion in a solvent solution to destroy the maskant adhesion.

The use of a solvent type stripper is particularly advantageous where manual stripping of fragile parts could cause distortion.

Fig. 8 illustrates etched parts in finished condition ready for subsequent processing.

Applications

Types of parts successfully etched range from simple dimensional reduction to multiple step-etch waffle patterns on double contour formed pieces. Overall dimensional reduction of castings and forgings, tapering by controlled immersion and withdrawal, and reaming tubes by pumping etchant solution through the tube are but a few examples of work accomplished by this unique tool.

In addition to the obvious advantages of dimensional etching as a manufacturing process, surface finishes are obtained which are structurally superior to machined surfaces, without altering the temper condition or inducing stresses in the part. Space requirements are minimal and the economic, labor, and power consumption factors are far more favorable than those required for conventional machine methods. The Dynamic Etching facilities of Convair,* San Diego, are illustrated in Fig. 9.

Limitations

There are limitations to what can be done by dimensional etching. For example, a slot in a surface cannot be etched to a depth greater than the width.

The principal limitation to dimensional etching as a mass production tool is the necessity of hand labor to scribe and strip maskant prior to etching. This limitation is considered temporary awaiting only refinements in materials and methods to remove the obstacles. It is the opinion of the authors

*All photographs by courtesy of the Convair Division of General Dynamics Corp., San Diego, California.

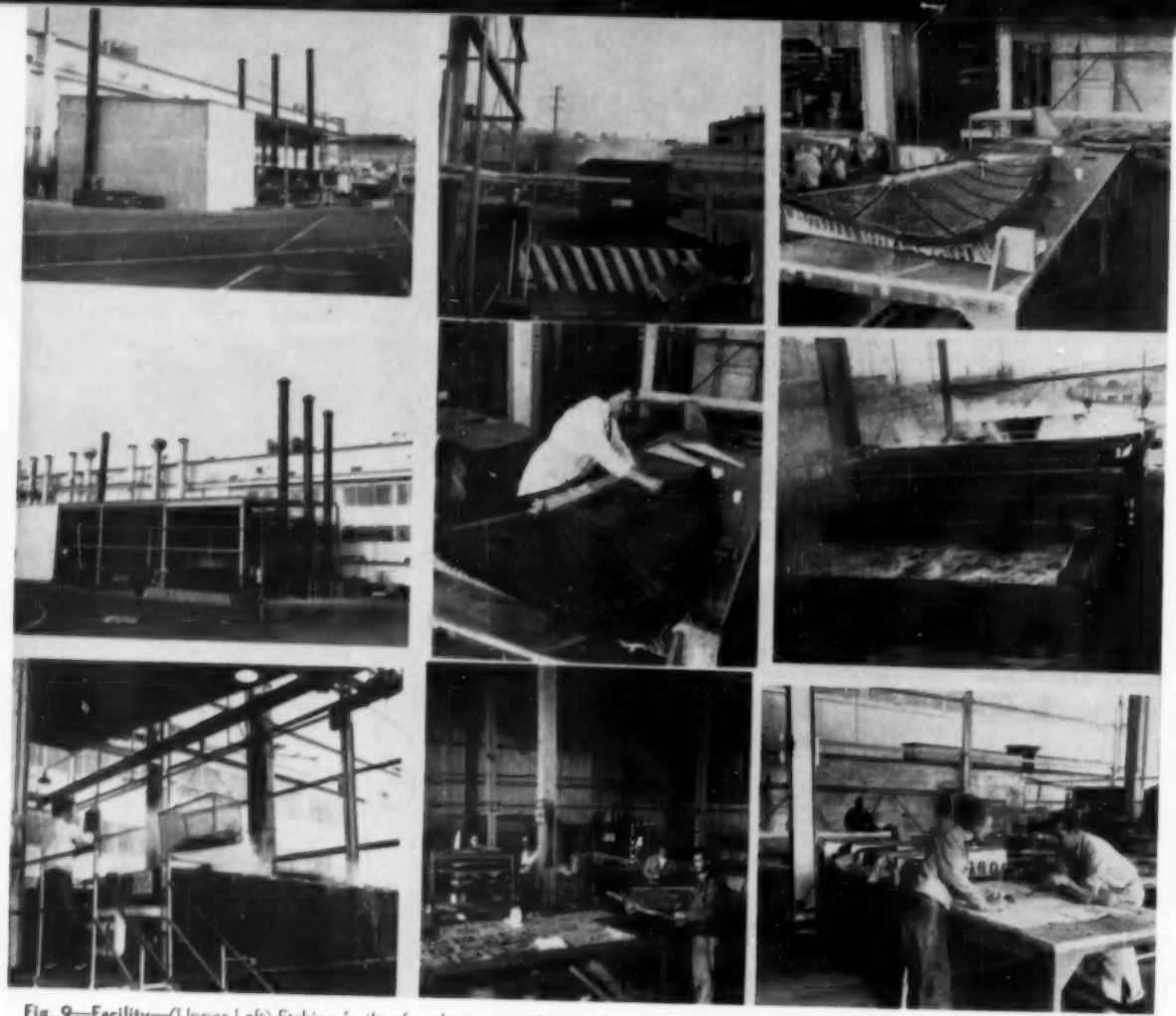

Fig. 9—Facility—(Upper Left) Etching facility for aluminum. (Upper Center) Settling tank for etching solution. (Upper Right) Wing tip ready to be trimmed. (Middle Left) Another view of the etching facility for aluminum. (Middle Center) Trimming of maskant in a wing tip. (Middle Right) Etching tanks line. (Lower Left) Etching tank for aluminum. (Lower Center) Trimming of parts. (Lower Right) Blueprint interpretation.

that the early pioneers of design etching techniques have revealed methods which, with refinements, may be employed by industry to remove this limitation.

Future

There is no obstacle to the application of dimensional etching for production of even the most complex pieces of metal or ceramic work, which refined methods and materials cannot solve. The economics of etching are far more favorable than machining, the limitations are few, and improvement of the processes await only those who are willing.

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PRACTICAL ASPECTS OF ALUMINUM HARDCOATING

by A. W. SWEET*

INTRODUCTION

QUITE OFTEN THINGS WHICH are easy to talk about are a more difficult to do. This is especially true of a new process where actual manufacturing experience is lacking. In spite of the wealth of excellent technical and research literature on the hardcoating of aluminum and its alloys as referenced in the bibliography, we again found that when a new process is put into operation many problems occur. Some can be anticipated, some overlooked and sometimes others ignored because of more pressing problems. Frequently, the greatest difficulties arise in bridging the gap between research and development operations and actual production, where factory control is generally not as precise as in the laboratory.

The literature on published types, merits, applications and characteristics of aluminum hardcoating, both here and abroad, were invaluable in first determining the value of aluminum hardcoating for our airborne applications. However, less information was available on the more practical aspects from a manufacturing viewpoint on such items as production equipment, costs, process problems, techniques and design details.

Our first approach to the use of aluminum hardcoating was to make a comparison of some of the various processes outlined in Fig. 1.

A decision was then made to test the Alcoa† hardcoat process for our airborne applications because it appeared to have some advantages. First, it is available on a royalty-free license basis. Second, the higher operating temperature would result in lower operating costs since initial refrigeration equipment would be less expensive and power consumption lower. Then too, direct current would simplify processing operations and the equipment cost would be lower than if alternating current were superimposed on direct current. This would, however, impose certain limitations on the alloys which could be processed. The hardcoated samples were tested and they met our engineering requirements. In addition to our applications on jet engine hydraulic controls involving valves, pistons, sleeves, gears, cams, etc., numerous other applications have been reported in the literature and additional applications are turning up.

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† Alumilite.

CHARACTERISTICS OF THE HARDCOATS

The following general characteristics of aluminum hardcoating were considered of great value primarily because the hardness, wear, corrosion and abrasion resistance enables utilization of a lightweight material for engineering applications where heretofore only hardened or electroplated ferrous materials or metalized non-ferrous materials could be used.

Hardness is difficult if not impossible to measure even by micro hardness testing techniques, but general acceptance places it between 7-9 on the Mohr scale. Hardness has been reported from approximately Rockwell C45 to C65. Practically the coating is file hard and very brittle.

COMPARISON OF PROCESSES

Variables	Alumilite	Martin	Hardas	Sanford
Solution Composition	12% Sulfuric, 1% Oxalic Acids	15% Sulfuric Acid Saturated With Carbon Dioxide	Sulfuric & Oxalic Acids	Mineral and Organic Acids
Operating Temperature	48–52 F	25–32 F	32 F	0–15 F
Amp/Sq Ft	36 (Lower on Thin Sheets)	25	100–300	12–15
Voltage	10–60 DC (or higher for Thicker Coatings)	10–75 DC	DC or AC & DC In Various Proportions	15–150 DC
Thickness versus Time	1 mil/20 min. up to 4 mil	1 mil/40 min.	1 mil/4–10 min.	1 mil/10–20 min.
Alloy Limitations	Over 3% Cu or 7% Si or 7–9% combined	Over 5% Cu	Not Limited By Higher Alloys	

Fig. 1

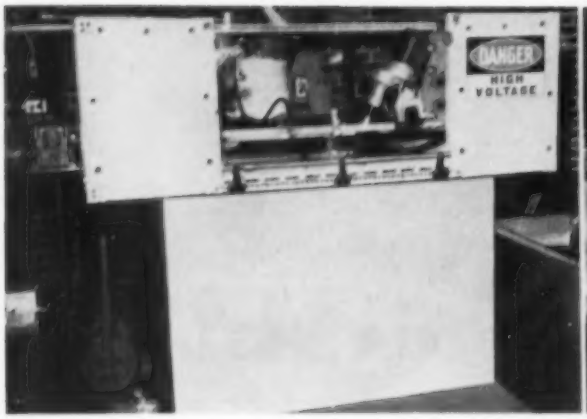


Fig. 2

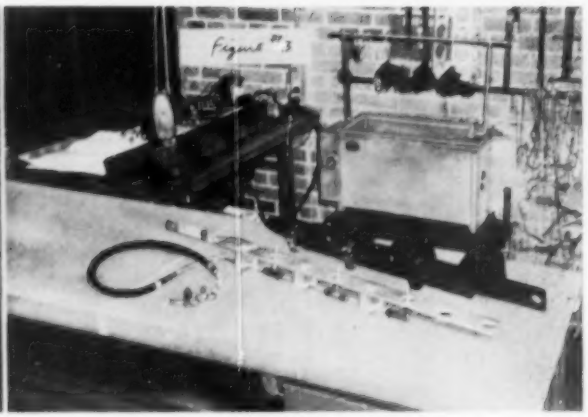


Fig. 3

Appearance and color vary with the alloy, process, surface roughness and coating thickness but generally ranges from a gray or tan to deep amber or black.

Coating thickness is a function of current density, time, temperature, alloy and process. Coating thicknesses have been reported up to 6 mils or greater. Our experience is that difficulties from burning can be encountered in processing to thicknesses much over 4 mils depending on part configuration and alloy.

Dimensional growth is approximately ½ coating thickness.

The coating when formed is in compression and the relieving of high stresses together with differential thermal coefficients of expansion between the base metal and the coating result in crazing of the surface. This rarely results in spalling at ordinary temperatures. When a part with a thick coating is removed from the processing solution and held against the ear snapping and cracking is audible.

Thermal and electrical conductivity are low and the coating acts as an insulator exhibiting high resistance to voltage breakdown and flame impingement. Voltage breakdown values have been reported higher than 2000 volts but our values have been lower.

Corrosion resistance to marine atmosphere, salt spray tests, humidity and general industrial atmospheric conditions is excellent. The coating will withstand several thousand hours salt spray test.

Chemical resistance is low since the coating is attacked by both acids and bases.

Wear and abrasion resistance are excellent. Various test methods and results have been reported.

Fatigue strength and endurance limit of a hardcoated piece are reduced as the cross sectional area occupied by the coating increases. This is not proportional because of the stress rising effect of crazing.

A differential coefficient of thermal expansion between the amorphous aluminum oxide coating and the aluminum base metal may cause checking or spalling at temperatures above 200-300 C. The extent obviously depends upon the particular alloy and coating thickness as well as higher temperature. The base metal can be melted by a direct flame on the hardcoating which may remain intact.

Processing cost has not been definitely established but it is felt it is relatively less than heat treating but more than conventional chromium electroplating and varies with thickness, alloy, part configuration and selective masking required.

Throwing power is excellent resulting in uniform thickness regardless of the configuration of the part except on very small radii and deep recesses. This facilitates processing parts to close dimensional tolerances.

Selective coating can be accomplished by special masking techniques which result in much higher costs.

Surface finish generally conforms to the original surface; however, a very smooth surface may be slightly roughened while a rough surface may become smoother.

Dyeing of thinner coatings up to 1 to 2 mils in thickness may be accomplished with reasonably good results, but this is not recommended since the sealing treatment impairs the corrosion, wear and abrasion resistance to some degree. Colors are not as brilliant as dyed anodic films and hardcoating is generally used for its physical qualities and not for its aesthetic appearance.

HARDCOATING

Hardcoating equipment requires more consideration than is generally given to that required for the thinner anodic films. Special consideration should be given to the design, construction and installation of this equipment since agitation, circulation of solution, refrigeration and temperature and power control are of prime importance.

Excellent results have been realized from the design and construction of an insulated fiber glass tank and exhaust system. The type of work we desired to process dictated a tank with inside dimensions 4 by 4 by 4 ft. This was constructed of two inch thick balsa wood sandwiched between an inner and outer liner of laminated polyester glass cloth. This type of design is cheaper, affords excellent thermal insulation for the electrolyte and at the same time facilitates maintenance since tank coatings are not required to prevent corrosion.

Close temperature control is desirable and of the two types of automatically controlled refrigeration systems considered, our choice was the direct expansion type into AISI type 316 stainless steel plate coils suspended by hangers in the front and back of the tank. AISI type 321 or 347 may also be used. This type of refrigeration system is considerably less expensive

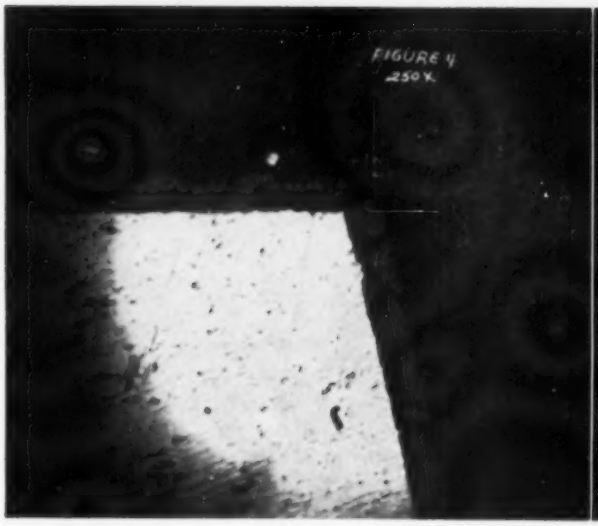


Fig. 4. Coating thickness approximately one mil.

Fig. 5

than the re-circulating brine type although it does have one major disadvantage: if a leak should occur in the system, the sulfuric acid electrolyte could be pumped into the compressor and damage it.

Agitation of parts to be processed and circulation of the solution are most important since the high current density required for the formation of the aluminum hardcoat necessitates high heat dissipation in order that there will be a minimum of coating solution. (W. J. Campbell of Hard Aluminum Surfaces Limited in England has published some excellent information on this subject in his technical paper entitled "Anodized Aluminum Surfaces For Wear Resistance.") Agitation has been obtained by pneumatic, hydraulic and mechanical means, all of which are considered to be highly desirable and required for most efficient operation. In other words, we simultaneously use bar agitation, air agitation, mechanical stirring and re-circulation. The re-circulation system of plastic plumbing also provides outlets controlled by valves to which tubing can be attached to circulate electrolyte into deep bores and recesses. This circulation facilitates processing deep bores to coating thicknesses averaging 4 mils varying in thickness only two- to three-tenths of a mil.

Automatically programmed power is best since it is difficult, if not impossible, to continually re-adjust voltage manually to maintain constant current density. Manual controls should also be provided and their use will be discussed more fully later. Excellent results have been obtained with automatic programming of 0-150 v to maintain a constant current density anywhere in the range of 0 to 100 amperes. Since we generally use 24 to 36 amp/sq ft of surface to be processed this limits the size of parts we can process to approximately 3 to 4 sq ft of surface area.

It was felt necessary to incorporate safety devices such as automatic inter locks on a totally enclosed tank exhaust hood shown in Fig. 2 to eliminate danger of personnel contacting power in the range of 25 to 100 amp at 25 to 150 v, which could be fatal.

Racks and fixtures should generally be of the same alloy being processed or one requiring a higher polarization or starting voltage. Where close tolerances are necessary, the rack material must be the same type alloy as the parts to be processed. We are now experimenting with titanium racks but have not as yet reached any conclusions or recommendations.

Positive electrical contact must be maintained during the entire processing cycle and is more critical than with other standard anodic processes. The racks should be strong, rigid, capable of conducting the required current and clamped to the anode bar to withstand violent agitation. Spring type clamps have not proven satisfactory. Clamps with pin type contacts so that contact can be made in two or more places are often desirable. Fastening parts to racks by alu-

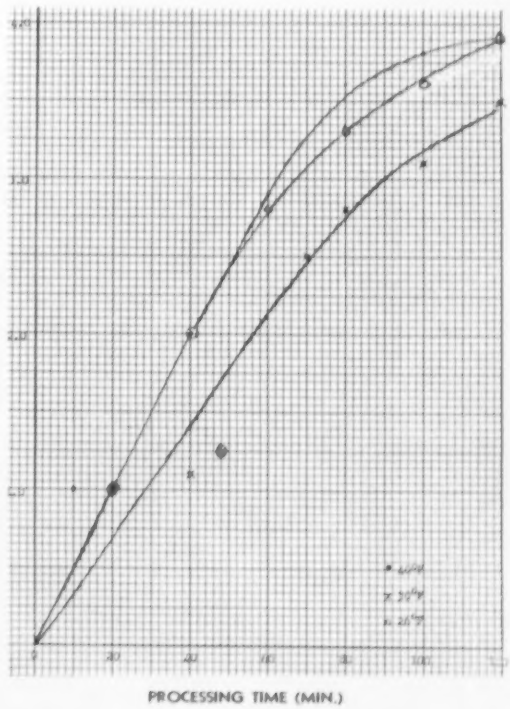


Fig. 6. 615 Aluminum samples processed at 36 amp/sq ft

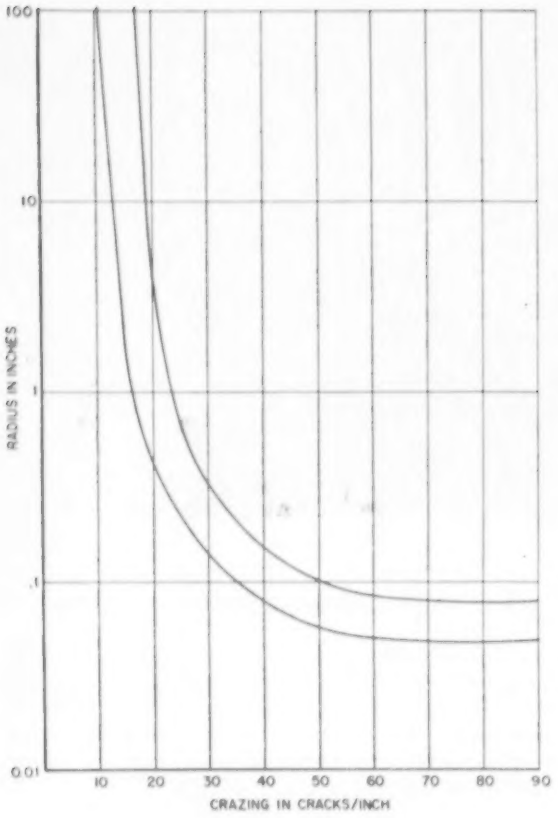
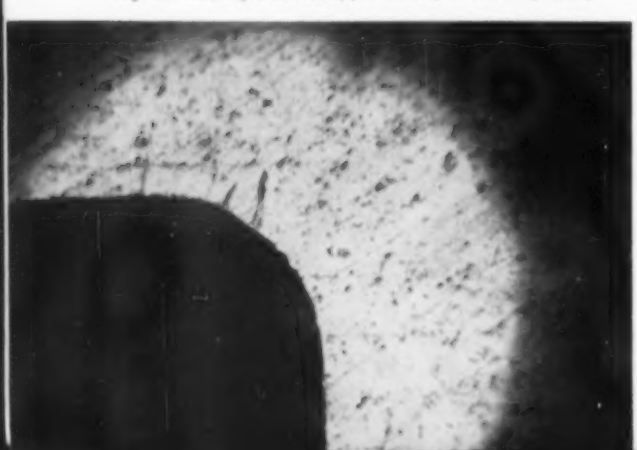


Fig. 7

minum screws or bolts works well providing they are masked so that they will not grow during processing and thus be difficult to remove. Where large parts extend out of solution, contact may be easily made by various means or parts clamped directly to the anode bar. Special racks containing nozzles for circulating solution into deep bores or recesses are extremely valuable as illustrated in Fig. 3 where one rack is masked and the parts which are attached by four screws are also selectively masked. We generally prefer to coat or mask the racks for the obvious reasons.

Occasionally it may be necessary to use auxiliary cathodes but this is not to be recommended. The anode to cathode ratio of 2/1 generally used for chromic acid anodizing may sometimes be increased to prevent burning. Lead cathodes in two opposite corners of the tank give good results. Stainless steel cathodes can be used but only alloys type 316, 321 and 347 are recommended. These may be raised or lowered to decrease or increase surface area in contact with the solution. It is not considered necessary to shield the cathodes.

Fig. 8. Coating thickness approximately one mil. (250X)



STRUCTURE OF THE COATINGS

Microphotographs in Figs. 4 and 5 clearly show the corner effect of hardcoating and also the crazing which develops. The break in the coating on corners is indicative of difficulties encountered in forming thick coatings on parts with sharp corners. The voltage must be increased after the initial polarization to maintain constant current density as the coating thickness increases. Eventually a voltage greater than the voltage breakdown value at the corner is reached and burning occurs with very rapid solution of both the coating and base metal in this area. At this point, a rapid rise in current can be noted on the ammeter and a corresponding decrease in voltage on the voltmeter. Only experience can determine when this point is about to be reached on particular alloys and parts of certain configuration. At this time, it is preferable to revert to manual control so that the voltage can be held constant or lowered to decrease the current density and thus prevent burning. Refer to Fig. 6 and note that this point was estimated at about 80 minutes processing time. Fig. 6 also illustrates that a longer processing time is required to lower temperatures. It is generally accepted that the thickness of the film is primarily dependent upon the total ampere minutes or ampere hours of processing time. In our processing experience at two different temperatures using the same size and material for the sample, the film will usually be somewhat thinner at the lower processing temperature. It is difficult to explain what process variable caused the wide difference between the samples processed at 26 and 30 F but this was probably due to lack of precise control of current density. Coating thickness for the data in Fig. 6 was obtained by taking the average of 6 micrometer readings at intervals on carefully machined samples.

Fig. 7 illustrates the relationship between crazing and the radius of outer curvature. This is strictly empirical. Fig. 8 illustrates that less crazing occurs on radii of inner curvature because the coating which forms in compression tends to be held in compression and stresses are not as easily relieved as on outside radii.

Figs. 8 and 9 illustrate that, although throwing power is excellent, the coating formation is retarded as the inside radius decreases. These microphotographs indicate that better and denser coatings can be developed on inside diameters than on outside. Thus, experience indicates less problems with hardcoated bores than with pistons in hydraulic valve applications where minute leakage cannot be tolerated.

PROCESSING DETAILS

Masking for selective hardcoating is expensive and presents many problems. The best materials are generally hard to apply and harder yet to remove. Wax is generally used but has a tendency to crack at lower temperatures. Tapes have not proven satisfactory except in conjunction with wax. Chromic acid anodizing serves as a masking medium but frequently breaks down especially with thicker coatings. A one-hour chromic acid anodizing treatment has proven better than the standard treatment. The procedure is to first anodize the part and then to remove the anodize from the specific areas which are to be subsequently hardcoated. An-

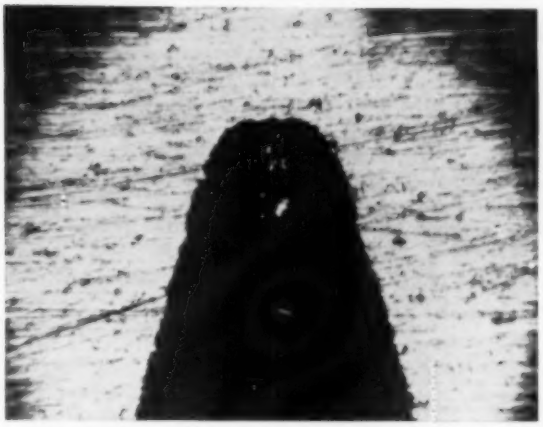


Fig. 9. Coating thickness approximately 2 mils. (250×)

other method is to mask the areas to be hardcoated before anodizing, anodize for one hour, remove the masking, apply wax over the anodize and then hardcoat. We prefer to use wax over the anodize as added insurance against masking breakdown.

This masking breakdown can result in loss of thickness control, burning, or the undesirable hardcoating of areas which on subsequent machining can present problems.

Properly applied chromic acid anodizing is a good stop-off for hardcoating, and it is not intended to imply that there is a general breakdown of this film in processing, although there may be some solution of the film. However, material thickness, part configuration, agitation and temperature can influence the breakdown of the chromic acid film in specific areas. Generally speaking, this breakdown will occur where there is over heating which occurs most frequently in thin sections, at corners or in recesses. Obviously, fewer difficulties will be encountered with stop-off breakdown (1) at lower operating temperature; (2) with designs eliminating sharp corners; (3) with better agitation and (4) with circulation into deep recesses. Although one of the considerations in choosing the Alumilite Process with the economy of operating at a higher temperature, practical considerations often dictate operating at the lower temperatures with resulting higher refrigeration costs.

There are apparently different opinions on whether hardcoating a piece partially anodized or anodizing a piece partially hardcoated is detrimental to either of the first coatings applied. Our experience indicates that both of the first films or coating are damaged because some solution of the coating takes place. The amount dissolved would depend upon the processing time, temperature, current density and heat dissipation. The fact that a chronic acid anodized film frequently breaks down when used for selective masking substantiates this belief.

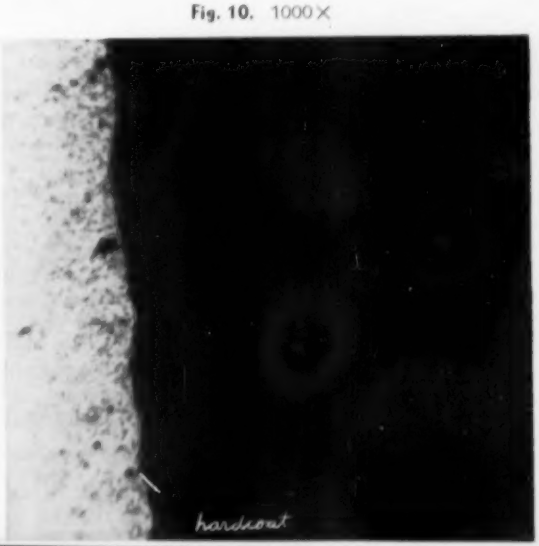
A hardcoated piece may be removed from the tank, measured and the coating build-up continued, providing processing is continued immediately. On only two occasions our plating personnel reported they had been able to continue build-up of a hardcoating after it had dried. This could not be duplicated in a subsequent test.

Where very small pieces are to be processed, it is helpful to process a larger panel of the same alloy to facilitate current density control.

There are instances where it is difficult or time consuming to measure the area to be processed. These instances can be dealt with in two ways. First, very small parts or very small areas are best processed together with a large panel of the same material whose area is known. Thus, the error in current density control is very small. The other method involves using an initial or starting voltage after polarization and a final voltage irrespective of the area to be processed. The initial and final voltages vary with the particular alloy. The starting voltage may be determined by noting the initial voltage required to provide a given current density when the area is known. Curves can also be made from test data correlating thickness with final voltage for each alloy when test panels of known area are processed at constant current density. These curves can be used with the starting voltage to guide the operator in processing a particular alloy to a desired thickness when the area is unknown. For example, we have determined that for 6061 aluminum alloy a starting voltage of 26 v is satisfactory and final voltages of 31 for a 1 mil thickness, 35 for a 2 mil thickness and over 65 for a 4 mil thickness indicate these thicknesses have been reached providing the current density at the starting voltage is maintained. For casting alloy 356 a starting voltage of 23 v is employed. Final voltages at the current density of the starting voltage are 26 v for 1 mil thickness, 47 v for 2 mil thickness and over 75 v for a 4 mil thickness. These values vary with solution concentration and contamination. We have experienced situations where the voltage has risen to over 100 v for coatings less than 3 mils. Burning usually occurs on parts of our configurations when voltages much above 75 to 80 v are employed. For this reason, the current density is decreased at this point to prevent burning and the processing time increased to obtain the desired thickness. There are times when you fly by the seat of your pants!

A few additional comments on processing methods, variables and problems may be in order. Normal cleaning procedures are used. The hardcoating is not hot water sealed. Solution control is not considered critical. Use of distilled or demineralized water is recommended. Alloy segregation can cause poor, thin, porous coatings and even burning in these areas. Heat treatment can affect the coating and best results have been obtained on solution heat treated alloys. Annealed alloys do not appear to give as good results. Welded parts or parts repaired by welding present problems. It is preferable not to use filler metal in welding. If its use is necessary, a low silicon filler material is best. Embedded tungsten electrode in a weld can cause burning and resulting scrap. Inserts are to be avoided because these must be masked and possible masking breakdown results in loss. Caution must be exercised in processing threaded parts and tolerance allowance made for growth. Very thin sections

Fig. 10. 1000×



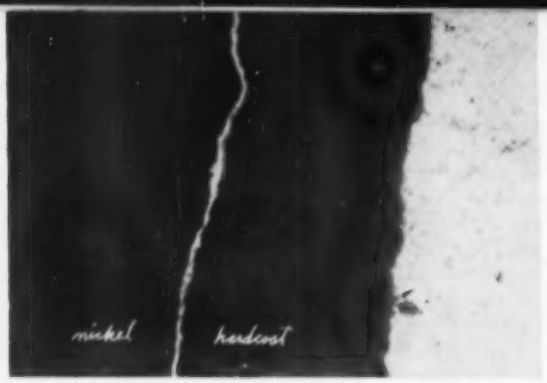


Fig. 11. Coating thickness approximately 3 mils. (1000 X)

often burn unless the current density and temperature are decreased or the anode/cathode area is increased.

FINISHED HARDCOATED PARTS

Little difficulty has been experienced in grinding, honing or lapping the coating to a tolerance of one to two tenths of a mil. In fact, since the outermost surface of the hardcoat is less dense and hard, it is preferable from a wear and abrasion standpoint to remove a few tenths of a mil. This appears to have little if any effect on corrosion resistance.

The hardcoat can be drilled, but since it is so brittle chipping occurs. Ultrasonic drilling or ultrasonic machining of odd shaped valve ports to very close tolerances has given excellent results and the reasonably sharp radii desired. The electrical discharge method of machining cannot be used to machine into the hardcoat but can be used to machine through aluminum and out through the hardcoat.

Where sharp radii are required on the lands and faces of pistons, grinding or lapping has not given the most desirable results. The hardcoat tends to chip at the corner. Various processing and machining methods and techniques have not been able to meet the most critical design requirements.

Where close tolerance parts have been machined out of tolerance, hardcoating with remachining to tolerance has frequently saved parts from being scrapped. With hundreds of hours of labor on this type of part, the savings are obvious.

Engineering design is important from the standpoint of tolerances, selective coating, designation of areas for contact purposes, use for bearing surfaces, etc. Standardization has been reached to the extent that drawings specify 2 mils of hardcoating. Machining allowance is made for the build-up or growth of one-half the coating thickness plus 2 to five-tenths of a mil to be removed by grinding or lapping in the finishing operation. This gives good results. Drawings now specify contact areas and frequently drilled or tapped holes are incorporated for racking and contact purposes as are extensions on the part which are later machined off.

Bearing surfaces of hardcoat against other materials has been satisfactory when good engineering design principles have been practiced. However, hardcoat against hardcoat is not recommended except for light loads and low speeds because the thermal insulation of the hardcoat causes over heating. Hardcoated gear teeth matting against bronze and against steel held up better than either when foreign material entered the gearing.

Samples of EC aluminum wire were hardcoated and tested for high temperature insulation. Fig. 10 illustrates that there is less crazing and porosity than in aluminum alloys. Several samples were electroless nickel plated with complete coverage of the hardcoat illustrated in Fig. 11 and preliminary adhesion tests were satisfactory. This has interesting possibilities in spite of fatigue and endurance problems. The nickel could serve as shielding while at the same time sealing the crazing and pores in the hardcoating which has low voltage breakdown values in the presence of moisture. The edges of a strip, 1 by 3 in., were ground to the base metal giving two isolated surfaces with a hardcoating thickness of 1 mil. Individual hipotting of the surfaces after a one hour bake at 400C gave a breakdown potential of 300 peak volts. Resistance between the nickel and base metal was greater than 4 megohms per square inch. A measurement as a flat plate capacitor at 1000 CPS resulted in 0.01 mfd.

The hardcoating of aluminum is a very valuable process but we still have much to learn in order to apply it properly and control the factory process.

ACKNOWLEDGMENTS

Credit and acknowledgment is made to the Aluminum Company of America, E. C. Elliot, Frederick B. Stevens Co., Inc. and T. N. Stanziola, G. Ball, H. Fergusson and B. Kellam, General Electric Company.

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A. William Sweet received his BS at Middlebury College in 1941 and did post graduate work toward his Master's degree at Middlebury and R.P.I. He served with the United States Army from 1941 to 1946 and was a Lt. Colonel. He joined General Electric, Schenectady, in 1946, went to Burlington in 1948 and was transferred to Johnson City Defense Electronics Division in 1954 where he is Specialist in Materials, Processes and Electrical Methods.

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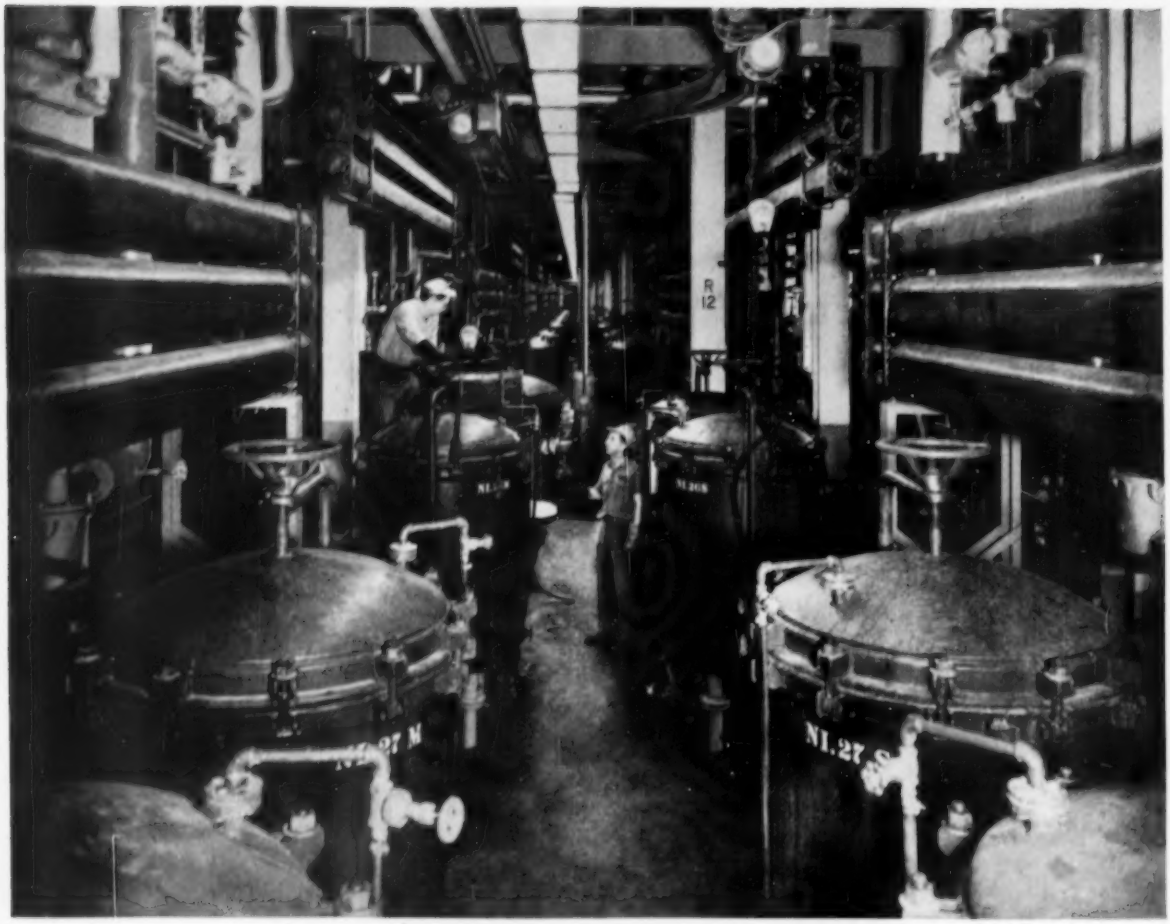

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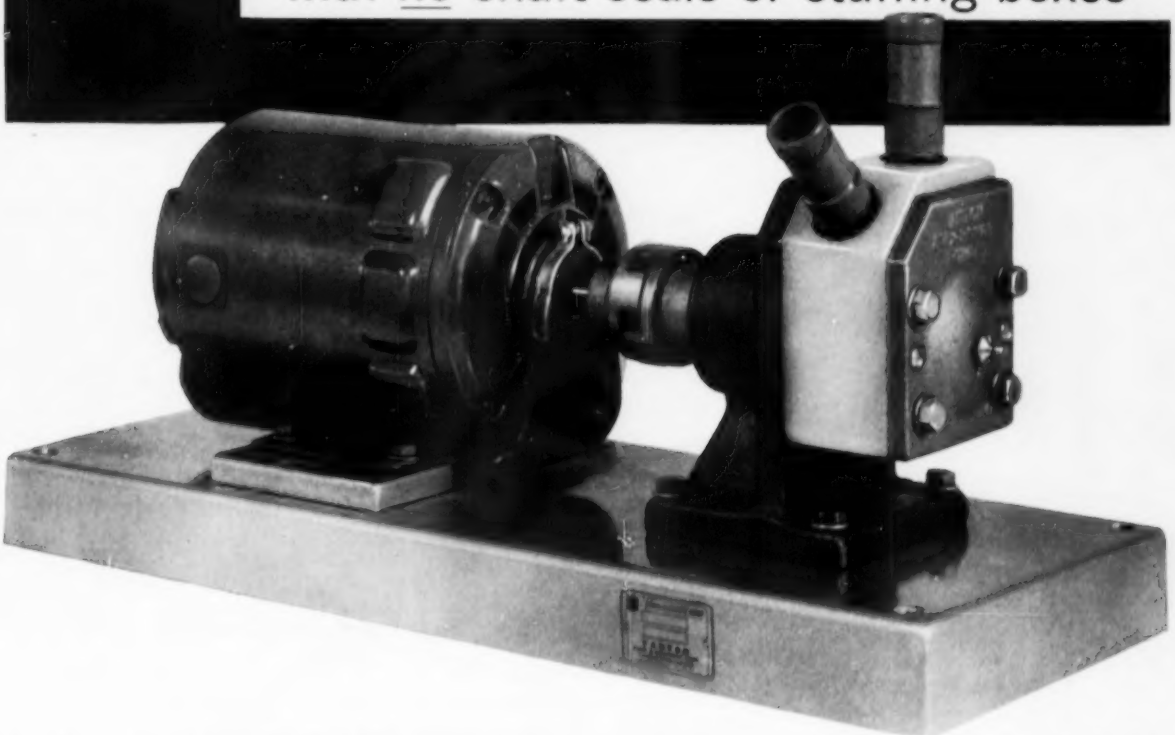

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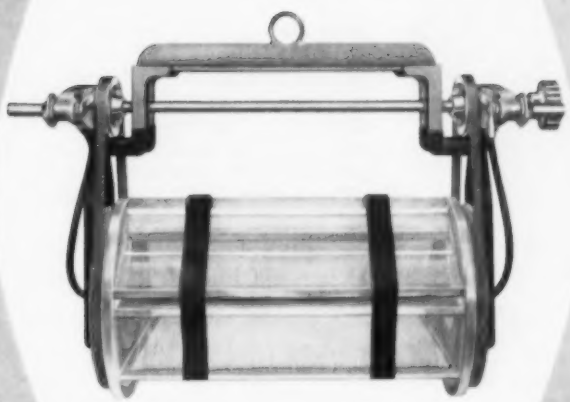
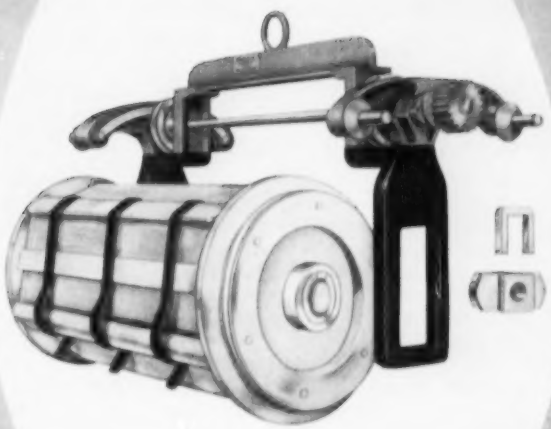


This design incorporates cylinder pulleys separate and smaller from the cylinder head. The hanger arms are semi-steel castings protected with 5/16" thick special vulcanized hard rubber.



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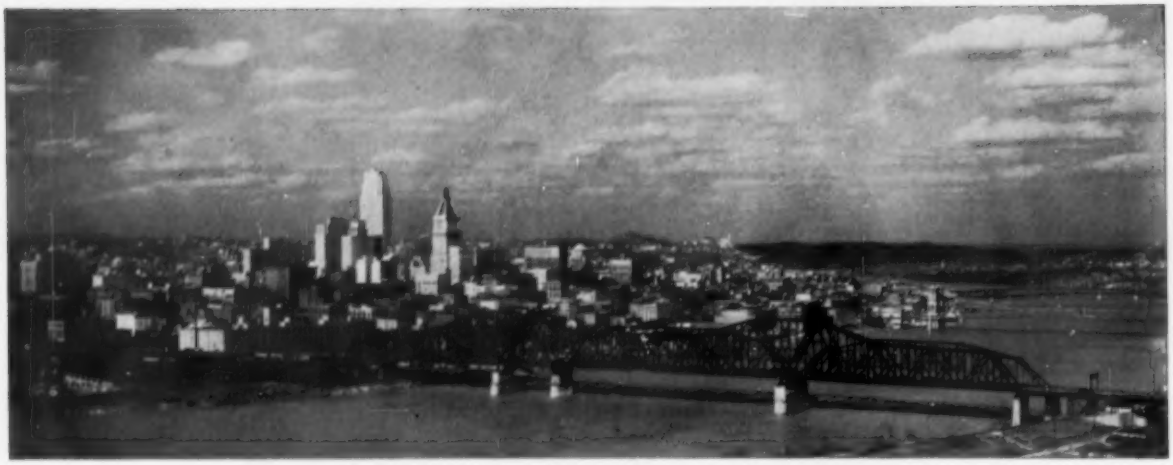

Cincinnati from across the Ohio River, 1958 AES Convention City.

THAT CINCINNATI BRANCH
Your 1958 Convention Host

BACK NEARLY A HALF-CENTURY ago, back in 1909 to be exact when electroplating as we now know it must have been in its infancy, a small group of platers, thirsting for improvement, succeeded in chartering a local branch of the American Electroplaters' Society.

They nurtured this seed through the depression and war years until it grew into the present Cincinnati Branch, with a membership of 110. This group, virtually on the eve of its Golden Anniversary, will play host to the 1958 Annual Convention of the AES, to be held May 19-22 at the Sheraton-Gibson Hotel in Cincinnati.

Little is known of the original Cincinnati Branch, but the existing records hint at the trials and problems which were ever with them. As late as 1938, the local branch could boast of no more than 16 members. At that time, Owen T. Towner, encouraged and assisted by AES National Headquarters, mounted a membership drive which doubled and tripled this number. Then global war impeded further growth. Momentum made headway after the war, however, and since that time, membership of the Cincinnati Branch has increased steadily. Its present 110 members are regarded as a foundation for further enlargement.

In the development of the Cincinnati Branch, naturally its Past Presidents made a significant contribution. The Branch recognized this dedicated effort and honored its Past Presidents at a Special Christmas Party in 1954. Its current honor roll of Past Branch Presidents includes:

1934-41 — R. J. Knoepfler
1942 — Harry Misner
1943 — William Stoddard
1944 — William Ehlen
1945 — H. E. Nice
1946 — August Schwering
1947 — John Daymude
1948 — William Albohn
1949 — Fred Brune
1950 — Ezra A. Blount
1951-52 — Robert D. Miller
1953 — Carl Truman
1954 — William Gordon
1955 — Robert Rarick
1956 — Edward Roof

Today's Cincinnati Branch is headed by President W. Wilson Loveless who is also chairman of the Hotel Committee for the 45th Annual Convention. A vice president of Varland Metal Service Company, Inc., Mr. Loveless attended the University of Cincinnati and shares his home in Cincinnati with his wife and three children.

Other officers for this year include:

First Vice President, Lester Helmich, Bendix Aviation; Second Vice President, Donald Gusse, National Distillers Corp.; Librarian, William B. Stephenson Jr., General Electric Jet Engine Plant; Secretary, David L. Kaplan, Auto Lite Co.; Treasurer, Gordon T. Speers, Quality Engraving & Electrotype.

Cincinnati members are justly proud of their regular meeting place. As a member of the Engineer & Technical Societies Council since 1944, they enjoy the facilities of the Engineering Building on East McMillan Street in Cincinnati. Few branches are favored with the refinements this building offers, including meeting rooms, parlors and dining facilities. Its auditorium is equipped with the latest projection and audio equipment.

The Cincinnati Branch played a strong part in the formation of the Tri-State Annual Regional Meeting, which began in 1954 in Cincinnati. This group is comprised of the following AES Branches: Cincinnati, Columbus and Dayton, Ohio; Indianapolis, Indiana, and Louisville, Kentucky. Each Spring, these Branches hold a fine Educational Session and Dinner Dance. The responsibility and location moves each year in alphabetical sequence. There will be no Tri-State Meeting in 1958, because of the 45th Annual AES Convention.

"Vas you efer in Zinzinnati?" The Cincinnati Branch is proud to be host of the 45th Annual Convention of the AES on May 19-22, 1958, and expects to greet you and your family there. Between now and then, a cordial invitation is extended, moreover, to all members of AES to visit the Cincinnati Branch and get better acquainted. Meeting time is 6:30 p. m., the fourth Wednesday of each month.

The main auditorium of the Engineering Society Building.

Cincinnati Sheraton-Gibson AES Convention Site

CONVENTION HEADQUARTERS for the 45th Annual Convention of the American Electroplaters' Society will be the 1000-room, air-conditioned Sheraton-Gibson Hotel, Cincinnati's largest. Overlooking historic Fountain Square in the heart of downtown Cincinnati, it is reached either by airport limousine or by about a five-minute taxicab ride from the Union Terminal, Cincinnati's attractive train station.

This large hotel, with long convention catering experience, is well equipped and well qualified to serve the AES efficiently and graciously. Its Roof Garden, for instance, has a capacity of 1000 for dining and 1700 for meetings. Its numerous public cafes and restaurants include the Sidewalk Cafe, the Keyhole Bar, the "31" Lounge Bar and Restaurant and, finally, the Florentine Room which is noted as one of the most architecturally perfect dining rooms in America. And for relaxation, there are ten bowling alleys in the hotel's lower level.

Sufficient hotel rooms to accommodate overflow AES crowds have been reserved in the city's other five downtown hotels by the Cincinnati Convention and Visitors' Bureau, Union Central Building, 4th and Race Sts. Since the Convention Bureau will handle all room allotments for this convention, all requests for reservations should be addressed to this organization.

"Vas you efer in Zinzinnati?" Whether yes or no, plan now to attend the 45th Annual Convention in that handsome, zestful Ohio River city. **You'll be so glad you did!**

Entrance to the Engineering Society Headquarters.

The Sheraton-Gibson Hotel at Fountain Square, Cincinnati.

A "WHO'S WHO" OF CINCINNATI'S FINE RESTAURANTS

CAPRONI'S RESTAURANT, 610 Main St. An excellent Italian restaurant where delicious Italian and American foods are served in attractive dining rooms. Fine wines and liquors.

COLONY RESTAURANT, across from Sheraton-Gibson on Walnut St. Good food, home made pastries, several large, beautiful dining rooms. Cocktail bar.

MAISONETTE, 505 Walnut St. A nationally recognized, exclusive French restaurant, serving tasty, artfully prepared French cuisine. Cocktail bar.

MILL'S RESTAURANT, 31 E. 4th St. Popular cafeteria serving good food in pleasant surroundings.

MECKLENBURG'S GARDEN, 302 E. University Ave. Fine old German restaurant, established in 1889. Excellent German foods, specializing in sauerbraten and wiener schnitzel. Fine wines and liquors.

GOURMET RESTAURANT, Terrace-Hilton Hotel, 15 W. 6th St. Exclusive dining place serving a la carte foods in modern surroundings. Glass-walled dining room overlooks the city.

GRAMMER'S, 1440 Walnut St. Fine German foods. Imported German beer.

OELSNER'S COLONIAL TAVERN, 1730 Dixie Highway, Lookout Heights, Ky. A short drive from downtown Cincinnati. Specializing in southern cooked meals.

BEVERLY HILLS COUNTRY CLUB, Newport, Ky., on route 27. Ten minutes from downtown Cincinnati. Good food served in one of the Blue Hills' largest and most beautiful theatre restaurants. Floor shows feature top stars of stage and screen.

WHITE HORSE TAVERN, 1501 Dixie Highway, Park Hills, Ky. Fifteen minutes from downtown Cincinnati. A warm, gracious restaurant specializing in genuine Kentucky ham dinners, charcoal broiled steaks and chops, country-fried chicken, mint juleps. Southern colonial atmosphere.

PIGALL'S, 462 E. 5th St. 1957 "Holiday Magazine" Award Winner for distinctive dining service. French cuisine a specialty.

VALERIO'S ITALIAN RESTAURANT, 114 E. 6th St. Famous for individually prepared Italian dishes served in an old-world atmosphere.

WONG'S, 216 E. 6th St. Excellent Cantonese food.

AES NEWS

Dr. Abner Brenner

Dr. Samuel Heiman

Dr. Edward Parker

Dr. R. E. Harr

BOARD NAMES SCIENTIFIC ACHIEVEMENT AWARD COMMITTEE

The AES's first "Scientific Achievement Award Committee" has now come into being as a result of appointment of this first such six-man committee by the Executive Board at the Board's recent Detroit meeting. Personnel of this high-honor group and respective tenures includes Dr. Abner Brenner, National Bureau of Standards (3 years); Leslie Diveley, Cutler-Hammer Co. (1 year); Dr. Russel E. Harr, Western Electric Company (3 years); Dr. Samuel Heiman, Philadelphia Rust Proof Company (2 years); Leland M. Morse, Chrysler Corporation (1 year) and Dr. Edward Parker, Technic, Inc. (2 years).

The committee's responsibility is the selection of the recipient of the Society's new "AES Scientific Achievement Award" from among the nominations of the respective Branches. The committee will announce the first such winner at the Cincinnati Convention in May. He will deliver the inaugural "William Blum Lecture" at the Society's Golden Jubilee Convention in Detroit in June 1959. At that same time in Detroit, the committee will announce the next year's Blum Lecturer and so on yearly.

L. M. Morse

L. Diveley

AES LIASON WITH OTHER SOCIETIES

1957-1958

1. **American Society for Testing Materials (ASTM)**
   John P. Nichols, American Electroplaters' Society, Inc.
   James D. Thomas, General Motors Corporation
   ASTM Committee A-5, Corrosion of Iron and Steel
   August Mendizza, Bell Telephone Laboratories
   ASTM Committee B-8, Electrodeposited Metallic Coatings
   Donald M. Bigge, Chrysler Corporation
   ASTM Committee D-19, Industrial Water
   George E. Best, Allied Chemical & Dye Corporation
   ASTM Committee B-7, Sub-Committee VI on the Anodic Oxidation of Aluminum and Magnesium Alloys
   R. F. Hafer, Reynolds Metal Company
2. **American Standards Association (ASA) Committee Z-74**
   Performance of Effluent Air and Gas Cleaning Equipment
   George Schore, Rapid Electric Company
   ASA, Committee Z-9, Sectional Committee on Safety Codes for Exhaust Systems
   W. R. Fidelius, Hanson-Van Winkle-Munning Company
3. **International Council for Electrodeposition & Institute of Metal Finishing**
   Dr. Walter R. Meyer, Enthone, Inc.
   Walter L. Pinner, Detroit Division, Houdaille Industries, Inc.
4. **Inter-Society Corrosion Committee**
   George E. Best, Allied Chemical & Dye Corporation
5. **Metal Finishing Suppliers Association**
   Earl W. Couch, The Lee Manufacturing Company
6. **National Association of Corrosion Engineers**
   George E. Best, Allied Chemical & Dye Corporation
7. **National Association of Metal Finishers**
   Arthur G. Pierdon, Art Metal Finishing Company
8. **National Technical Task Committee on Industrial Wastes**
   Dr. D. G. Foulke, Hanson-Van Winkle-Munning Company
9. **Ohio River Valley Sanitation Commission**
   William J. Neill, Columbus Metal Products, Inc.
10. **Society for Plastic Engineers**
    Arthur W. Logozzo, Nutmeg Chrome Company
    Lester . Wolfe, Enequist Chemical Company

INTERIM MEETING HOTEL RESERVATIONS

Delegates and Alternates planning to attend the Fifth Interim Meeting are urged to make their hotel reservations promptly. Write M. Lester Reynolds, 328 East 47th Street, Indianapolis, Indiana.

Mohawk Valley Becomes AES's 57th Branch

The Mohawk Valley Branch, temporarily chartered last June, was granted a permanent charter at the recent meeting of the Executive Board and consequently became the Society's 57th Branch. Located in the historic Upstate New York area of which Utica and its environs are prime parts, the Mohawk Valley Branch already boasts 45 members and is fast growing.

The Branch will be formally inducted as an AES Branch at a meeting of installation now being planned. The Charter will be presented to it by National President Francis T. Eddy with other National Officers also present.

Golden Jubilee Educational Sessions Named

At the recent meeting of the Executive Board, the Board named the educational sessions of the 1959 Detroit Convention which will climax the Society's observance of its Golden Anniversary. International in scope, the sessions will be known as the "Fifth International Conference on Electrodeposition and Metal Finishing sponsored by the Golden Jubilee Convention of the AES." Walter L. Pinner, Houdaille Industries, Inc. of Detroit is the Conference's chairman.

W. L. Pinner

W. J. Neill

New Delegates Manual Published

The Society's new "Delegates Manual" has been published and copies will be distributed by National Headquarters to all Delegates as promptly as these Branch representatives have been accredited and identified to it by the Branches as required by the AES Bylaws as amended by the Supreme Society last June. Bylaw deadline for identifying such authenticated Delegates to the National Office is the first Monday in November.

The little white booklet specifying duties of Delegates was written by Past President William J. Neill and also appears as a chapter of "Branch Officers Manual".

TENTATIVE PROGRAM
FIFTH INTERIM MEETING

MAROTT HOTEL,
INDIANAPOLIS, INDIANA

FRIDAY, JANUARY 10
(9 A.M. Start)
Meeting, Executive Board

FRIDAY, JANUARY 10
(Evening)
Indianapolis Branch Meeting
Attendance by National Officers and Delegates Alternates Invited.

SATURDAY, JANUARY 11
(10 A.M. Start)
Interim Meeting
Luncheon
Interim Meeting
Adjournment
Cocktail Party

SUNDAY, JANUARY 12
(9 A.M. Start)
Meeting, Executive Board

(SEE NEXT ISSUE OF PLATING FOR FINAL PROGRAM)

Boggess Heads Blue Ridge Group

The Blue Ridge electroplaters, preparatory to seeking a temporary charter as an AES Branch, held their meeting on September 6, 1957 at the Carleton Terrace Coffee Shop in Roanoke, Va. The report of the secretary was received and participation of this group in the Technical Education Session of the Southeastern Branch was approved. **Howard Welfare** was appointed liaison.

The nominating committee presented the following slate of officers who were unanimously elected: President, **T. R. Boggess**; 1st vice president, **N. F. Murphy**; 2nd vice president, **Bruce Wallace**; secretary-treasurer, **Carl Witherspoon**; Librarian, **Paul Callahan**; Chaplain: **S. H. Reynolds**; Board of Managers: **Tom Johnson, Howard Weaver** and **Howard Welfare.**

A committee for bylaws for the local group was appointed by the president, as follows: N. F. Murphy, Paul Callahan, Bruce Wallace and Carl Witherspoon.

The speaker of the evening was **Ezra Blount,** editor of Products Finishing. Mr. Blount discussed the various educational activities of the branches and showed slides of the laboratory and lecture sessions. Mr. Blount also showed slides taken in Japan during his stay there and discussed plating practices in that country.

Nelson F. Murphy

Dr. William Blum

R. A. Ehrhardt

C. M. Sample

F. Ogburn

PROJECT RESEARCH PERSONNEL IN TWO-DAY MEETING

The first Research Conference of the AES has been scheduled by the Research Committee to be held in Washington, D. C., on December 10-11 with a full assembly of Project Directors and Project Fellows expected to be present to discuss matters of common importance pointed toward enhancing the effectiveness of the Society's Research Program.

With attendance necessarily restricted to research personnel, including members of the Research Committee, Sessions chairmen will be Dr. William Blum; Research Committee Chairman Robert A. Ehrhardt; Dr. Russel E. Harr, vice chairman for Research and Dr. Abner Brenner of the National Bureau of Standards. Host Project handling all meeting arrangements is Project No. 13 whose chairman is Clarence M. Sample of the International Nickel Company and whose Project Director is Fielding Ogburn of the National Bureau of Standards. Dr. Blum, Mr. Sample and Mr. Ogburn served on the Research Committee's task subcommittee that programmed the meeting.

The Research Committee itself will meet in a full day's meeting at the Sheraton Park Hotel, Washington, D. C., on Thursday, December 12.

NOTICE OF PROPOSAL TO AMEND AES CONSTITUTION AND BYLAWS

The Constitution of the Society now requires for amendment a two-thirds vote "of all Delegates". This is an uncommon provision and is not endorsed by any major parliamentary authority. The objection to requiring a two-thirds vote of all members of any body is that it stalls practically all business that comes under its provisions. First, it requires the presence of at least two-thirds of all members eligible to vote, and this is not always obtainable. Second, it requires a practically unanimous vote, and this is never obtainable when there is any difference of opinion. Because the margin of members present above two-thirds is in the nature of things always small, an insignificant fraction of a membership can defeat measures which perhaps nine out of ten members want.

The two-thirds figure is generally accepted as a fair dividing point between the rights of a whole group and the protection of a minority; but the ratio is universally based on the total of opinions expressed—that is, of votes cast. Robert, the AES parliamentary authority, says in his Rules of Order (1943: pp. 204-205) that if previous notice is given, a two-thirds vote is sufficient protection for minorities on amendments to a constitution, and that "two-thirds vote means two-thirds of the votes cast, ignoring blanks, which should never be counted."

To bring AES procedure into workable form, in agreement with Robert and accepted practice, your Executive Board approves the following motion:

> **Moved that the Constitution of American Electroplaters' Society, Part III, "Revision", Section I, "Authority", be amended by striking out the expression "of all Delegates", and adding "by roll call" after the words Annual Meeting.**

Passage will leave the Section reading: "This Constitution or any part thereof may be repealed, altered, annulled, or otherwise amended by a two-thirds vote either at an Annual Meeting by roll call, or by letter ballot, after regular procedure of initiative and notice as provided in Sections 2 and 3 of this Article." The required two-thirds vote will stand defined as in Robert, above; and the Society will be responsive to such consensus as general experience has shown to be satisfactory and safe.

To secure in this case enough votes to make the two-thirds "of all Delegates" at least possible, the Society will take a letter ballot during December. Also proposed in that letter ballot will be identical amendment of Part III, of the Society's Bylaws. Delegates are urged to make prompt return.

Francis T. Eddy
President

PATENT ABSTRACTS

DR. D. GARDNER FOULKE
Manager, Electrochemical Development
Hanson-Van Winkle-Munning Co
Matawan, New Jersey

Copies of patents may be obtained by writing to Commissioner of Patents, Washington, D. C. Price 25 cents each.

No. 2,790,731, 4/30/57—Apparatus for Production of Electrically Resistant Films—B. Ostrofsky and J. Ballard, assignors to Commonwealth Engineering Co., Dayton, Ohio.

A gas plating process wherein chromium hexacarbonyl is volatilized on a ceramic base is described.

15 claims, figure.

No. 2,790,733, 4/30/57—Deposition of Cadmium by Chemical Reduction—D. Couch, assignor to United States of America. (Navy).

Cadmium is deposited on iron, copper, and brass in a fused salt bath at 200–300C containing an alkali metal formate (88–99.9 per cent by weight) and 0.1 to 12 per cent of a cadmium compound which ionizes for sufficient time to form desired coating.

8 claims.

No. 2,790,740, 4/30/57—Phosphater Coating Composition—R. Ayres and E. Heinzelman, assignors to Oakite Products, Inc., N. Y.

The aqueous bath contains at least 0.06 oz/gal of zinc or manganese as compounds, at least 0.07 oz/gal of an oxidizing compound, phosphoric acid in an amount at least 15 per cent in excess of the amount necessary to react with the zinc or manganese and at least 9×10^{-4} oz/gal of cerium as a compound.

10 claims.

No. 2,790,756, 4/30/57—Electrolytic Treatment of Slide Fasteners—C. Cohn, Atlantic City, N. J.

Claim 1 is as follows: "A method for the electrolytic treatment of a slide fastener of the zipper type having metallic interengaging elements comprising subjecting the elements of the closed zipper to compression to distort the shape of individual elements to reduce clearances between adjacent interengaging elements thereof and then progressing the closed zipper through an electrolytic bath while causing it to conform to a curvature such that electrical continuity is enforced between the interengaging elements thereof and while at least some elements thereof are in conductive contact with a member carrying current for the treatment.

2 claims.

No. 2,791,052, 5/7/57—Printing Plate—G. Vasel, Philadelphia, Pa.

The plate consists of a basking layer of rubber-like material (natural and synthetic rubbers) and a metalized surface layer consisting of a plasticized synthetic resin (vinyl and vinylidine chloride) having mixed therein fine aluminum powder to the extent of 1 part per hundred parts of resin. The metalized surface layer is bonded to the rubber layer and forms the patterned surface of the printing plate.

3 claims, figure.

No. 2,791,515, 5/7/57—Metal Coated Glass Fiber—H. Nack, assignor to The Commonwealth Engineering Co., Dayton, Ohio.

Glass fiber material coated with a Werner complex chromium compound (methacrylic acid) is heated in an enclosed zone containing a metal carbonyl.

11 claims, figure.

No. 2,791,516, 5/7/57—Electroless Plating—C. Chambers and R. Spaulding, assignors to the General Motors Corp., Detroit, Mich.

An electroless nickel solution is described as containing at least one nickel salt and a reducing agent is passed through a filter charged with nickel salt to remove solid material and replenish the nickel salt. The solution is rapidly cooled before it enters the filter.

9 claims, figure.

No. 2, 791,517, 5/7/57—Diffusion Chromium Coating Steel Surfaces—G. Becker and F. Steinberg, assignors to Deutsche Edelstahlwerke, A.G., Kefeld, Germany.

A chromium rich steel surface may be obtained by diffusion chromium treating a steel containing carbon from 0.02 to 0.15 carbon and titanium, niobium or tantalum in the ratios Ti = 5XC, Nb = 10yC and Ta = 10zC where Ti, Nb and Ta stand for per cent of each element and x, y, and z represent fractional coefficients totaling unity and C is per cent carbon in the steel.

6 claims.

No. 2,791,525, 5/7/57—Oxalate Coatings on Steel—W. Rausch and A. Mayr, assignors to Parker Rust Proof Co., Detroit, Mich.

The bath consists of 1.6 to 12 g of fluoborate ion, 0.08 to 2 g of chlorate ion and about 5 to 15 g of oxalic acid in a liter of water. The *p*H range is given as 0.7 to 2.0.

12 claims.

No. 2,791,553, 5/7/57—Electroplating Aluminum—T. J. Conner and R. Blumberg, assignors to General Electric Co., N. Y.

An aluminum article is immersed in a zinc plating bath and treated anodically at 2–60 asf, then the polarity is reversed and zinc is plated on the article for at least one second. Thereafter other metals may be electrodeposited on the zinc coated article.

18 claims.

No. 2,791,554, 5/7/57—Electrodepositing Zinc—J. Winters, assignor to Ann Hull and A. Medert, Trustees, Cleveland, Ohio.

The use of an addition agent containing a bath soluble polyepoxyamine resulting from the condensation reaction of epichlorohydrin with a primary amine is claimed. The concentration is given as 0.25 to 4.0 g/l in Claim 2.

6 claims.

No. 2,791,556, 5/7/57—Apparatus for Rejuvenating Hypo Solutions—C. Duisenberg, Palo Alto and R. Bedford, Los Angeles, Calif.

A shaft with spacers and flat circular conductors is made cathodic and rotated near one or more anodes to remove silver.

See also No. 2,791,556, issued to J. Pigeon, Ontario, Canada with 7 claims.

5 claims and figure.

No. 2,792,340, 5/14/57—Magnetic Materials—J. James, assignor to British Thomson-Houston Co., Ltd., England.

To produce sheets of iron in which the majority of the crystals are aligned to have two cube edges (100) directions substantially at right angles in the plane of the sheets, form a sheet of substrate material having said grain orientation, electroplate thereon a second metal of related orientation and removable, electroplate

VALUABLE RESULTS OF AES RESEARCH PROJECTS CONTAINED IN THESE SERIAL REPORTS

JUST OFF THE PRESS

The Nature, Cause and Effect of the Porosity in Electrodeposits, I & II—By Fielding Ogburn, Asaf Benderly and Margaret Hilkert. *Serial 36, Project 13, $1.00*

OTHER AVAILABLE REPORTS

Cleaning and Preparation of Metals for Electroplating, IV, V, VI & VII—By H. B. Linford & E. B. Saubestre. *Serial 26, Project 12, $3.50*

Methods for Testing Thickness of Electrodeposits, II & III—By H. J. Read & F. R. Lorenz. *Serial 27, Project 7, $1.35*

Porosity of Electrodeposited Metals—By N. Thon, D. G. Kelemen, L. Yang, S. Yang, D. Dean. *Serial 28, Project 6, 85 Cents*

The Analysis of Electroplating Solutions for Major Constituents—By E. J. Serfass & M. H. Perry. *Serial 29, Project 2, 90 Cents*

Effect of Basis Metal Condition on Plating, I & II—By A. E. R. Westman & F. A. Mohrnheim. *Serial 30, Project 14, $1.10*

Effect of Surface Finishing of Nonferrous Base Metals on Protective Value of Plated Coatings—By G. J. Kahan, W. W. Macchia, J. M. Fairbank. *Serial 31, Project 4, 45 Cents*

Effect of Impurities and Purification of Electro-Plating Solutions, VII & VIII—By D. T. Ewing, J. K. Werner, A. A. Brouwer, C. J. Owen and W. O. Dow. *Serial 32, Project 5, $1.00*

How the Small Electroplater Can Treat Cyanide Plating Waste Solutions with Hypochlorites—By Barnett F. Dodge and Walter Zabban, Yale University, New Haven, Connecticut. *Serial 33, Project 10, 50 Cents*

Effects of Impurities and Purification of Electroplating Solutions, IX, X & XI—By Dr. D. T. Ewing, Dr. A. J. Smith & Dr. W. O. Dow. *Serial 34, Project 5, 50 Cents*

Cleanability and Oil Spreading Rates—By H. B. Linford & P. E. Grubb. *Serial 35, Project 12, 50 Cents*

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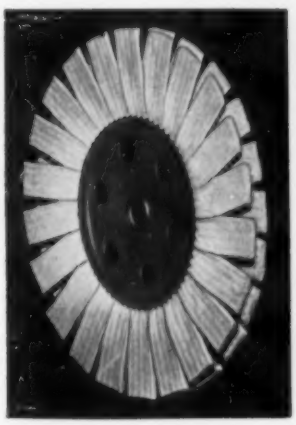

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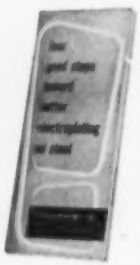

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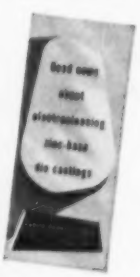

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iron on the second metal from a 600 g/l ferrous chloride bath (*p*H = 1.8, temp. = 50C, cd = 10 asf) to thickness of 0.002 inches. Remove the coated substrate and strip film from substrate.

5 claims.

No. 2,792,342, 5/14/57—Electrowinning of Copper—S. Tuwinner, assignor to Phelps-Dodge Corp., N. Y.

A bath containing ferric and ferrous sulfates and acid is passed over a charge containing copper whereby the copper becomes copper sulfate and some ferric sulfate is reduced. The solution is then electrolyzed between copper cathodes and stainless anodes to deposit sulfur and oxidize the ferrous ion to ferric.

14 claims, 7 figures.

No. 2,793,140, 5/21/57—Gas Plating—B. Ostrofsky and J. Ballard, assignors to Commonwealth Engineering Co., Dayton, Ohio.

A metallic support with a dome thereon as a plating chamber is described—along with means whereby heat can be supplied to the object so it can be plated by carbonyl decomposition.

15 claims, figure.

No. 2,793,177, 5/28/57—Synthetic Dead Metal—W. Fourier, assignor to Tenak Products Co., Chicago, Ill.

A method of preparing electrotypes from printing plates is described as comprising adhering fibrous material impregnated with thermosetting resin to the plate in the routed areas, compressing said fibrous material and curing the resin. Thereafter a matrix is prepared from the plate, rendered conductive and plated.

13 claims, figure.

No. 2,793,178, 5/21/57—Insulator with Multiplicity of Conducting Elements—C. Morris, assignor to Radio Corporation of America.

The method of providing an insulating plate having a plurality of openings with metal plugs within said openings comprising the steps of coating the surfaces of said plate and the walls of said openings with a layer of a first metal, depositing a layer of a second metal on said first metal and filling said openings with said second metal, removing said layers of said first and second metals from the surfaces of said insulating plate and leaving said metals in said openings, and raising the level of the metal in said openings above the surface of said insulating plate.

11 claims.

No. 2,793,179, 5/21/57—Recovering Gallium—P. de la Breteque, assignor to Societe Anongme pour l'Industrie de l'Aluminum, Chippis Switzerland.

Metallic gallium is obtained from alkali aluminate lye by electrolysis using a mercury cathode. The gallium is then extracted with alkali and again electrolyzed on another cathode to get gallium in the free state.

8 claims, figure.

No. 2,793,420, 5/28/57—Electrical Contacts to Silicon—R. Johnston and R. Rulison, assignors to Bell Telephone Labs., Inc., N. Y. C.

Clean and polish the silicon body, electroplate just enough nickel to obliterate the silicon color, wash, heat to 800C for ½ minute in an oxygen-free atmosphere. Then electrodeposit a second layer heavier than the first and soldering electrodes to the nickel.

3 claims, figure.

No. 2,793,961, 5/28/57—Composition for Preparing Metal Surfaces—G. Oven, assignor to Rinshed-Mason Co., Detroit, Mich.

Pitted surfaces previously treated by a phosphoric acid com-

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ESTOX 150 GLASS CLEANER—A combination of alkaline salts and wetting agents with additives to remove tarnish from sheet or plate glass.

ESTOX 163 PHOSPHATE COATING—to clean and coat iron phosphate on ferrous materials. Fine grained for ideal paint base.

ESTOX 170 DEOXIDIZER AND BRIGHTENER—designed to deoxidize aluminum or brighten copper and brass. Easily handled in dry form. Non-hazardous.

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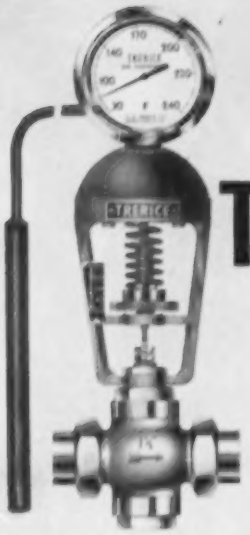


Why

TRERICE

Temperature Control

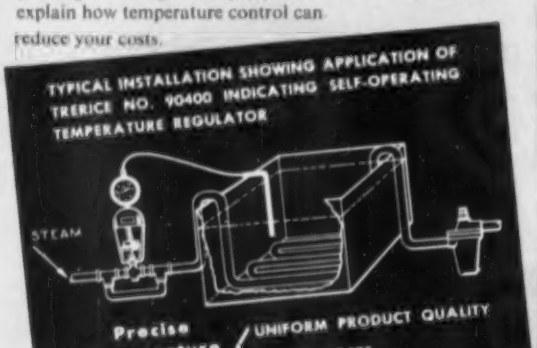
. . . in Plating and Metal Finishing Operations?

WHY temperature control? First of all, to assure uniform quality; second, to reduce processing costs.

Maintaining bath temperatures at the *one best level* used to be a serious problem. But not anymore. Today, TRERICE controls are automating plating processes throughout the metal finishing industry . . . maintaining precise temperatures *automatically*—TRERICE regulators prevent evaporation losses, cut down on rejects, insure uniform product quality! You save time, labor and fuel costs. Not surprising, then, that TRERICE controls are standard with leading original equipment manufacturers. Behind this wide acceptance is the TRERICE reputation for quality, and a nation-wide sales and service organization.

The TRERICE line is a *complete* line. Each TRERICE temperature control installation is set up to meet the specific requirements of the user, insuring uniform product quality at the lowest cost.

If your operation involves cadmium, chromium, copper, nickel, tin or zinc plating; anodizing, bonderizing, cleaning, pickling or rinsing, it will pay you to have a "Trerice Man" explain how temperature control can reduce your costs.


TYPICAL INSTALLATION SHOWING APPLICATION OF TRERICE NO. 90400 INDICATING SELF-OPERATING TEMPERATURE REGULATOR
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Precise Temperature Control
UNIFORM PRODUCT QUALITY
LOWER COSTS

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H. O. TRERICE CO. 1424 W. Lafayette Blvd., Detroit 16, Mich.

Factory representatives in principal cities of U.S. and Canada

position have applied to them a paste of antimony sulfide (30–60 per cent), zinc oxide (20–55 per cent), silica powder (2–10 per cent) in alcohol (16 to 50 per cent) of iso-propyl or ethyl).

2 claims.

No. 2,793,965, 5/28/57—Galvanizing Composition—H. Myers and O. Proctss, assignors to U.S. Steel Corporation, N. J.

Small articles are galvanized in a drum containing:

Zinc—4 to 13.5 parts by weight.
Flux—at least 1 part by weight.
$SnCl_2$—To give Sn equal to ¼–4 per cent of zinc.

after which the articles (100 parts to above) and charge are heated to 1200–1650 F while the drum is rotated. The flux is zinc ammonium chloride.

10 claims, figure.

No. 2,793,989, 5/28/57—Waveguide Structure—R. Goodman et al, assignors to Gar Precision Parts, Inc., Stamford, Conn.

A method for electroforming wave guides is described.

7 claims, figure.

No. 2,794,001, 5/28/57—Descaling Metals—G. Carter, assignor to E. I. duPont de Nemours and Co., Wilmington, Delaware.

The scaled metal, insoluble in caustic, is immersed in a bath of molten sodium hydroxide containing 0.5 to 20 per cent by weight of sodium carbide.

18 claims.

No. 2,792,341, 5/14/57—Electrodeposition of Platinum—R. Atkinson, assignor to International Nickel Co., N. Y.

Crack-free platinum in the form of electrodeposits can be obtained from a bath containing 180–300 g/l of hydrogen chloride and about 10–50 g/l of platinum chloride at 45–90C. The rate of deposition to obtain the desired results is shown in a drawing relating said rate to the hydrogen chlorfde concentration.

4 claims, figure.

No. 2,793,990, 5/28/57—Electrodeposition of Copper-Tin Alloys—E. Heymann and G. Schmerling, assignors to Silvercrown, Ltd., London, England.

Bright copper-tin alloys are claimed to be deposited from a bath (complex copper cyanide and sodium stannate) containing 0.003 to 0.3 per cent of a soluble lead compound as a primary brightener. The effect of the primary brightener is increased by use of a secondary brightener, the salt of acetic, cyanic thiocyanic tartaric and citric acid.

6 claims.

No. 2,793,993, 5/28/57—Electrolytic Treating Apparatus—R. Stock and John McLay, assignors to Allegheny-Ludlum Steel Corp., Brackenridge, Pa.

An apparatus for treating strip by electro-processes is described, claim 1 being: "In an improved electrolytic treating apparatus for continuously treating electrically-conductive strips within a solution of a bath container having contact rolls operably mounted above the level of a solution of the container and electric connections of one potential to the contact rolls, the combination of a support structure positioned above the container and connected to electrical current of opposite potential, at least one cross member suspended from said support structure, at least one column suspended from said cross member and extending into the solution of the container, electrode material carried by said column along its length, means positively insulating said column from said cross member at its point of suspension thereon, a conductor bar independently suspended from said cross member in a transversely spaced-apart relation with said column and extending into the solution of the container in such a spaced-apart relationship with respect to said column, said conductor bar being electrically connected to said cross members at its point of suspension thereon, cross arm means extending across

transverse spacing between and electrically connecting a lower portion of said conductor bar to a lower portion of said column to supply the only current of opposite potential to said column, so that current will only flow upwardly along said column to energize the electrode material carried thereby."

5 claims, 14 figures.

No. 2,793,994, 5/23/57—Plating Rack—Joseph Novitsky, Jamaica, N. Y.

A plating rack with removable tips is described.

1 claim, figure.

No. 2,794,775, 6/4/57—Electroplating with Tungsten—W. Buckingham, assignor to Western Union Telegraph Co., N. Y.

Claim 1 is given in its entirety in view of the interest this patent will have for many: "The method of forming a coating of tungsten on an object which comprises making said object the cathode in a plating bath of an aqueous solution of phosphotungstic acid to which has been added an aqueous solution of an alkali hydroxide in an amount to cause the *p*H of the bath to have a value of approximately 7.2 to 7.6 with a specific gravity in the range 1.175 to 1.250, passing a plating current through said bath, maintaining the temperature of said bath at approximately 60 to 80C, controlling the plating voltage to a value of approximately 2.35 to 2.65 v to cause to be deposited on the object a thin adherent coating of an oxide tungsten, removing the object from the plating bath and heating the same in a reducing atmosphere at an elevated temperature until said coating is reduced to a thin adherent layer of substantially pure tungsten, and repeating the foregoing plating and reducing cycle until a layer of tungsten of desired thickness is deposited on said object."

7 claims.

No. 2,795,032, 6/4/57—Electrodeposited Cathode Grids—D. Kerstetter, assignor to Sylvania Electric Products, Inc., Mass.

The steps of applying to a surface of an apertured metallic strip a layer of material having grid-work conductive design portions exposed through the apertures in the strip, and plating the exposed portions to build up the level of the design to a desired thickness in the strip and to bond the plating to the strip.

8 claims, figure.

No. 2,795,040, 6/11/57—Joining High Temperature Melting Point Metals—D. Antel, et al., assignors to Westinghouse Electric Corp., E. Pittsburgh, Pa.

Claim 1 is as follows: "In the process of joining metal members having a melting point greater than 1400C, the steps comprising depositing from an aqueous solution a uniform thin metal phosphide coating of a metal selected from at least one of the group consisting of cobalt and nickel on at least one of the members in the area where the members are to be joined, the phosphorus comprising less than 15 per cent of the weight of the metal phosphide and heating the members at a temperature of from 800 to 1400C, in a protective atmosphere, for a period of time sufficient to cause the coating to flow, and while the members are in contact with one another in the position in which they are to be joined, the heating in the protective atmosphere being continued for a period of time to drive off substantially all the phosphorus from the phosphide thereby joining the members with a metal bond having a low phosphorus content and of a much higher melting point."

5 claims.

No. 2,795,490, 6/11/57—Etching Aluminum—K. Newman, et al., assignors to Turco Products, Inc., Los Angeles, Calif.

Smooth, substantially module-free etched aluminum can be obtained from an alkaline etching bath if there is dissolved therein a compound having a reactive sulfur or —SH group capable of forming a precipitate with iron, zinc or copper ions.

See also No. 2,795,491 by same inventors (14 claims) describing the use of alkali metal sulfides and polysulfides.

21 claims.

(Continued on page 1232)

Look!

New 6" wide buff-finger and triple-over-lapping feature of

CHURCHILL FINGER-BUFF* #501

GIVES SUPER-FLEXIBILITY

for buffing

IRREGULAR SHAPES

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INDUSTRY NEWS

New structure of the International Rectifier Corporation

International Rectifier Occupies New Building—Coincident with its tenth anniversary, International Rectifier Corp. of El Segundo, Calif. has recently occupied two new facilities, bringing the number of plant buildings in the area to seven.

The new contemporary structure located at 233 Kansas St. is completely air conditioned for year 'round comfort and is unique in that it is built around a central patio which provides an abundance of natural light and a pleasing view to the offices surrounding it. Constructed of steel, red brick, glass and redwood, it houses the executive, sales, accounting and purchasing offices of the firm. Approximately 10,000 sq ft are devoted to the production of silicon and germanium power rectifier junctions.

Wagner Bros. Opens New Office—A new office branch has been established in New York by Wagner Brothers Inc., Detroit. The new office, at 109 Baker Street, East Syracuse, N. Y., will cover all of New York state and northern Pennsylvania. Its operation will be directed by Tom Kohler, newly appointed district manager. Mr. Kohler was a sales engineer in Wagner's main office prior to his appointment.

International Chemical Opens in Southern Florida—The International Chemical and Metallurgical Corp. has opened offices in the Sweet Building in Ft. Lauderdale, Florida to supply the metal finishing and metallurgical industries in Florida and Latin America. The corporation will handle a complete line of supplies and equipment representative of the leading manufacturers of the nation.

Herbert M. Frazier, formerly of Pittsburgh and Washington, D. C., a metallurgist of many years experience, both in industry and government, heads the corporation as its president. Joseph A. Barile, formerly with the Royal Plating and Polishing Company of Pittsfield, Mass., is vice president and general sales manager. Wendell P. Barrows of Washington, D. C., was elected secretary and brings with him a background of technical and scientific knowledge and practical experience gained from his long association with the National Bureau of Standards and the United States Naval Gun Factory.

Although the corporation is incorporated to handle all supplies and equipment used by the plating and metallurgical industries, the corporation is prepared to act with laboratory facilities and technicians, as consultants on problems encountered by companies engaged in the business.

Pennsalt Builds in Canada—Pennsalt Chemicals Corp. has selected a ten-acre area near Oakville, Ontario, as the site of its first plant in Canada. As a component of Pennsalt Chemicals of Canada, Ltd., a wholly-owned subsidiary, the new unit will facilitate the distribution of Pennsalt chemical specialties not now available in eastern Canada and will make possible the extension and improvement of customer services. The one-story, brick structure already under construction is expected to be completed in December 1957.

Largest Chem Milling Installation—The world's largest vertical tapering tank for chemical milling is now in operation at the Manhattan Beach, California, plant of the United States Chemical Milling Corp. producer of chemically milled products.

The tapering tank which extends 60 feet underground, was installed with its accompanying facilities to meet the demand for extremely long tapered structures in the design of advanced aircraft.

Chemical milling is the controlled removal of metal by a chemical etchant. One of its most valuable applications is the creating of smooth tapers on long parts, such as the wing spars for an airplane. A part is tapered by controlling the rate of immersion into the solution.

Sarco Relocates Headquarters—Sarco Company, Inc., and Sarcotherm Controls, Inc., manufacturers of steam traps, temperature controls, and heating specialties have the moving of their national headquarters from the Empire State Building to expanded office facilities at 635 Madison Ave., New York City. They will occupy the entire twelfth floor of this newly-constructed, modern building, in the move scheduled for October 1, 1957. The company's manufacturing facilities are located in Bethlehem, Pa.

Haveg Acquires Reinhold Engineering—Haveg Industries, Inc. has acquired as a wholly-owned subsidiary, the Reinhold Engineering and Plastic Co., Inc. of Norwalk, Calif., producers and fabricators of plastics for the aircraft missile industry as well as chemical corrosion equipment.

Haveg Industries, has, by this move, added extensive production facilities. Reinhold, originally founded in 1928, employs 220 employes, operating 40,000 sq ft of modern plant facilities. It has had extensive experience in polyesters, epoxies, heat-resistant phenolics, melamines, silicones, alkyds, and dialylphthalate with such reinforcing materials as glass fabric, mat and roving; asbestos fibers and mats; and also glass, paper, metal, and foam core materials.

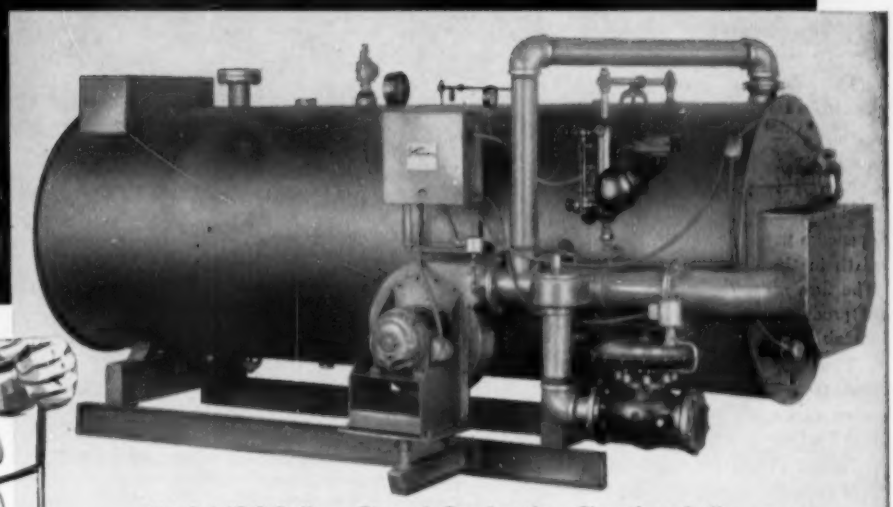
Permutit and Pfaudler Merge—The Pfaudler Co., Rochester, N. Y., and the Permutit Co., New York City, have merged under the name Pfaudler Permutit Inc.

Henry W. Foulds, chairman of the board and president of Permutit and Ranlet Miner, board chairman of Pfaudler, will become chairman and vice chairman, respectively, of the board of the combined companies. Pfaudler president, Mercer Brugler, will be president and chief executive officer and Donald A. Gaudion, Pfaudler executive vice president, will be executive vice president.

Executives of both companies have stressed that the merger will open the way for large scale participation in the field of pollution control and industrial treatment of waste water.

CG Electronics Expands—Expansion of production facilities equal to five times their original manufacturing space is announced by CG Electronics Corp., Albuquerque, N. M., with the acquisition of a machine shop in Albuquerque.

AT LAST A BOILER DESIGNED FOR THE PLATER!



Model 105 Sellers Closed Combustion Chamber Boiler

NOW—No more foul fumes because of incomplete combustion due to back draft through boiler created by exhaust fans or poor draft conditions.

SELLERS solves this problem with the improved design, closed combustion chamber boiler. All air for combustion, both primary and secondary, is pushed through the boiler under positive pressure, independent of partial vacuum in the building and independent of any back draft on the chimney (of course, products of combustion must be removed from building).

A positive pressure blower supplies air under pressure which is mixed with the gas and passed to burners in the completely closed combustion chamber; to complete combustion, secondary air is fed into the closed chamber under positive pressure (many times greater than the vacuum in the building). By this method of securing positive complete combustion, burned gases are pushed through the boiler and FOUL FUMES ARE ELIMINATED.

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2. ALL-ON, ALL-OFF RUNNER PILOTS
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5. POSITIVE PRESSURE BLOWER OVERCOMES BUILDING VACUUM AND CHIMNEY BACK DRAFT
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Vertical Steam Boilers • Immersion Tank Heaters • Gas Combustion Equipment

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The expansion will principally affect the electroplating and printed circuit activities, while the addition of the complete machine shop facilities will enhance production ability.

CG Electronics operates as a wholly-owned subsidiary of Gulton Industries, Inc., Metuchen, N. J.

New Parker Rust Proof Plant—Parker Rust Proof Co. of Detroit, has opened a new plant at St. Louis, Mo., its sixth in the United States and Canada. The firm manufactures an extensive line of products for the surface treatment of metals.

The 40,000 sq ft structure provides manufacturing and warehouse facilities to serve customers in the Midwest, South and Southwest.

Named as plant manager at St. Louis is Ronald P. Gajdos, who formerly managed the company's New Jersey plant. Carl W. Moore is the Southwestern regional sales manager, 2177 E. Milwaukee Avenue, Detroit. Other plants are located at Morenci, Mich.; Mountain View, N. J.; Cleveland, O.; Maywood, Calif. and Toronto, Ont.

At the new Parker plant, left to right, Ronald P. Gajdos, plant manager; Carl W. Moore, St. Louis regional sales manager; Robert W. Englehart, president; John L. Christian, vice president of Monsanto Chemical Co.

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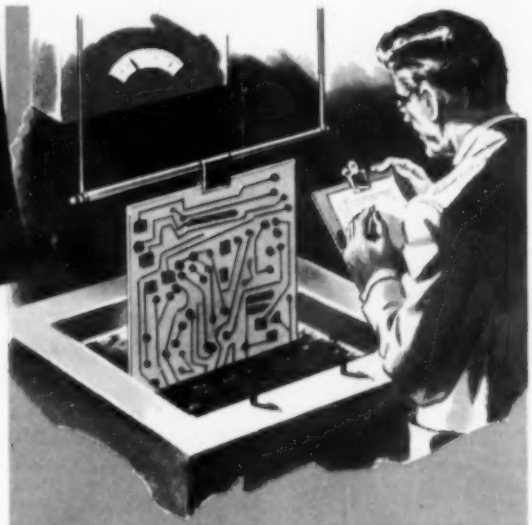

Technological knowledge acquired through many years of experience, plus special processes and equipment, assure the high quality of our Rhodium Plating Solutions.

Recommended for contact surfaces of switches, waveguide parts and other electrical applications, such as printed circuits...Can be applied in extremely heavy deposits, up to 100 milligrams per square inch.

Rhodium plating provides the advantages of whiteness, lustre and corrosion resistance of a precious metal.

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INDUSTRY NEWS BRIEFS

● Stability of the lead price, the largest refinery production since 1942, and good over-all industrial demand for lead supplemented by Government purchases for the National stockpile featured the domestic lead industry in 1956. The steel strike and cutback in automobile production resulted in some decline in the use of lead, but total consumption during the year was only 0.3 per cent less than in 1955 and exceeded by 4 per cent the average of the 5 years, 1951–55.

● The inadequate supply condition prevalent in the copper industry since the latter part of 1954 changed in 1956 to one in which more than enough copper was available for requirements. Mine production, smelter output from domestic ores and world production established new highs in 1956. Prices of domestic copper rose to the highest levels in over 90 years, and foreign prices also increased to high rates. The Government, to assist in alleviating the inadequate supply situation, authorized release of copper from Defense Production Act inventories, permitted postponement of stockpile deliveries, and banned or curtailed exports of copper raw materials.

● Production of zinc oxide in the United States during July 1957 totaled 15,900 tons, 9 per cent above the June output, according to the Bureau of Mines, United States Department of the Interior. Lead-free zinc oxide production during the month remained virtually unchanged at the June rate of 12,900 tons.

● The Business and Defense Services Administration (BDSA) has announced the appointment of a compliance and enforcement officer for the Los Angeles area to investigate alleged widespread violations in that area of regulations relating to the use of nickel—a metal in scarce supply.

In making the announcements, the BDSA referred to a recent action (August 9) by the United States Attorney for the Southern District of California in which a criminal information in 17 counts had been filed in the case of a chemical company and two individuals for violation of the Defense Production Act. Other willful violators similarly will be prosecuted, BDSA said.

● Plating supply houses are in general adhering to the Business and Defense Services Administration recommendations regarding the fair and equitable distribution of nickel for civilian use, the BDSA, U.S. Department of Commerce, has reported.

The problem of nickel distribution was discussed recently at a meeting of the primary consumers of nickel attended by the electroplating industry advisory committee.

The committee reported that as a result of the equitable distribution procedures followed by the respective supply houses they had not been faced with any complaints with respect to the distribution of anodes made from market-price nickel.

BDSA officials stated that they expected the government-owned Nicaro project in Cuba to continue to make available at least as much nickel for plating in the fourth quarter as was supplied in the third quarter of this year. Although it was generally felt by the advisory group that there had been favorable acceptance of the currently available Nicaro nickel by the plating industry, representatives from the Nicaro project, serving as agents for the Government, anticipated a lowering of the iron content of this nickel as an added precaution against plating hazards.

The following industry representatives were present: Louis M. Hague, Hanson-Van Winkle-Munning Co., Matawan, N. J.; Ralph L. McGean, McGean Chemical Co., Cleveland, Ohio; C. Walder Parke, Harshaw Chemical Company, Cleveland, Ohio; H. S. Thrasher, Seymour Manufacturing Co., Seymour, Conn.; Clyde H. Reeme, Udylite Corp., Detroit, Mich.; Joseph Wagner, Wagner Brothers, Inc., Detroit, Mich.

● Lea-Ronal, Inc., Jamaica, N. Y., announces that E. I. du Pont de Nemours & Co., Inc., was granted a license to one of the Lea-Ronal patents on copper plating processes entitled "Bath for Plating Bright Copper" and covered by U.S. Patent 2,770,587. This is one of the Lea-Ronal patents covering bright copper plating.

Flaking and Peeling Troubles In Barrel Nickel Plating

●

The most pressing problem in barrel nickel plating is flaking and peeling (often nickel from nickel) on the plate. These are related troubles which have solutions. Flaking and peeling of nickel from nickel are the same in varied degrees. The cause is usually operation of the nickel solution above the point where ductile plate is produced. In barrel plating the average current density bears little resemblance to the maximum current density on the parts. Thus pointed parts and other parts which do not tumble well will have very high current densities at one time or another while the load is being plated. Parts which tumble well and have rounded corners will not have this high current density. The correction involves all the factors which raise the burning point of the plating solution. These include, high boric acid content, high nickel content, elevated temperatures, higher barrel speeds and lower voltages. Naturally only one or more of these may need to be changed to eliminate the trouble but they will help correct trouble with flaking and laminating. There are two other troubles which may contribute. If the peeling is down to the base metal the cleaning cycle may be at fault. Contamination of the solution may also cause trouble since it produces brittleness and may cause films. Included among the contaminants are copper, zinc and an excess of brighteners. Heavy plates require more care than thin plates and hardened parts are more difficult to secure good adhesion to.

●

True Brite Nickel Brighteners has proven itself capable of ductile, high quality bright nickel directly from the solution by over ten years of use in the plating plants of the country large and small. You too can benefit by its trouble free operation.

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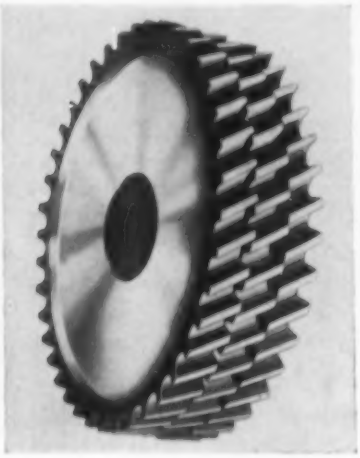


E—1100. Rubber Contact Wheel—A versatile new rubber contact wheel has been introduced by Chicago Rubber Co. for difficult metal grinding and finishing operations.

The wheel, known as the R-58, shapes itself to the contours of the object that is being ground. Because of its deep serrations the new wheel will conform to such difficult shapes as boat propellors, intricate automobile hardware, and many types of household utensils. It cuts much faster because it hugs the contours better and, consequently a greater area is contacted with each pass.

Production tests are said to have shown that the deep-grooved R-58 wheel increases the life of abrasive belts up to 200 per cent or better. Since the belt is more flexible when riding on the deep grooves, it can shake out dull abrasive and prevent the glazing that shortens belt life.

E—1101. Automatic Washer—A new automatic 3-in-1 washing machine that provides for all cleaning operations in one central area and virtually eliminates rehandling of parts following cleaning operations has been designed by The Alvey-Ferguson Co. Because it performs the work of three separate washers in a single housing, this new A-F triple tunnel type machine saves floor space and is claimed to reduce operating and maintenance costs.

Two overhead conveyors and a flat wire mesh belt conveyor pass through the machine, which incorporates an automatically-timed wash-rinse-dry cycle. In operation, parts are placed on the appropriate overhead conveyor according to subsequent operations to be performed on them. While one overhead conveyor is carrying parts to sub-assembly from the washer, the other trolley conveyor is taking parts through painting and drying operations. The flat wire mesh belt conveyor handles parts, including machined parts, which cannot be effectively cleaned and dried when suspended from an overhead conveyor, as well as parts routed to other destinations, such as storage. The three conveyors may be operated either simultaneously or individually as required.

E—1102. Self-Filtering Ultrasonic Cleaner—Development of an ultrasonic cleaner with a self-contained filtering system, has been announced by Vibro-Ceramics Division of Gulton Industries, Inc.

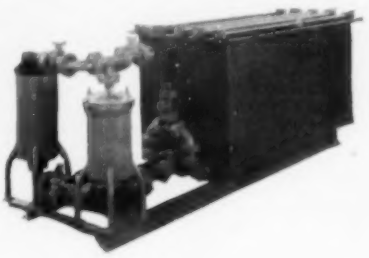
The Glennite U-102 circulating ultrasonic cleaner operates on a frequency of 40 to 44 kc, incorporates a forced air cooling system and has a cleaning tank capacity of one gallon. Only sudless detergents or chlorinated solvents are required.

A circulating pump, permanent filter element and an additional tank for recirculating the fluid eliminates the time-consuming task of manually draining the tank and filtering the dirty fluid to render it reusable. The circulator automatically begins operating at the conclusion of the predetermined cleaning period.

E—1103. Rust Proof—Heatbath announces Rustguard, a new product, for in-between rust proofing of ferrous metals. Rustgard is a water soluble material containing a rust inhibitor. It is mixed 1 to 20 parts with water and applied by immersion or spray at temperatures up to 212 F. It is used on ferrous metals to prevent rust and as a final protective finish over conversion coatings such as black oxide and phosphates.

E—1104. Electroless Gold Plating—Metal Processing Co. announces an electroless gold plating process, Lustralloy-G. This coating was developed primarily for use on its electroless nickel. The gold deposition is continuous and deposits at a rate of about 0.0324 g/sq in./hr (0.0001 in.). The deposit is quite tarnish-resistant and, for equivalent total plate thickness, it is claimed that salt spray results are equally as good as those of electro-deposited gold. The process is considered to be practical enough so that it can be applied where thin deposits of this metal are desired.

E—1105. Compact Electroplating Unit—A new "packaged electroplating plant" which is reported to provide volume precision electroplating in a compact, space-saving unit, has been introduced by Sel-Rex Corp., Nutley, New Jersey. Known as the Sel-Rex Industro-Pak plater, the units have been designed with the specific needs of the volume precision-components plater in mind.



They were tested and perfected, under actual operating conditions, in the plants of prominent electrical and/or electronic component manufacturers. The unit illustrated consists of a 500 gal steel tank, coated with 3/16 in. thickness of special vulcanized rubber, equipped with a jet orifice manifold at the bottom. Continous or intermittent filtration is possible through the built-in filter and slurry-tank. The Industro-Pak plater is completely bussed with necessary anode and cathode bars in the amperage capacity required by the application.

E—1106. Magnetic Motor Starter—A new NEMA size 0 and 1 magnetic motor starter that is 42 per cent smaller than previous open forms, has been developed by the General Electric Co.'s general purpose control department for such applications as machine tools, pumps, hoists, blowers and mixers.

Radically different in design, the new starter is of "snap-slide" construction. Principal components simply snap or slide together for quick inspection and maintenance. Contacts can be inspected in seconds, without using tools.

E—1107. Corrosion Inhibitor—A new corrosion inhibitor for use in sulfuric, sulfamic and phosphoric acids has been developed for descaling and pickling baths.

The product, Inhibitor 2508, is an aliphatic derivative made by the Chemical Division of Armour and Co. It can be used where acids are employed to chemically remove undesirable coatings from metal surfaces.

In liquid form, it readily disperses in water and is effective in low concentrations, and can be used at rates as low as 100 to 500 ppm.

The INSIDE story of *Fulflo Filters* For Continuous Micronic Clarity

Inside every Fulflo Filter is the exclusive Honeycomb Filter Tube . . . engineered in a wide range of positively controlled densities to give you the exact degree of micronic clarity you want. Honeycomb Filter Tubes are made from cotton to resist almost any alkaline solution — dynel for resistance to acids. Hundreds of filtering tunnels provide true depth filtration at minimum pressure drop.

Fulflo Filters clarify any size tank *two or even three times an hour*. Compact size allows for installation on individual tanks, even where space is limited. Containers are available in steel, stainless steel, or rubber-lined steel. Fulflo is low in initial cost, economical to operate.

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AUTOMATIC TUBULAR CONVEYORS • COOLANT CLARIFIERS

E—1108. Cyanide Copper Process—A new bright cyanide copper plating process using new combination of additives said to reduce plating costs and simplify control, has been introduced by Metal & Thermit Corporation. Called M&T Bright Cyanide Copper, the process also promises fast plating speeds, improved brightness and other advantages on all common basis metals.

Stability of the proprietary materials eliminates the problem of products decomposing in the bath, it is claimed. Only one chemical determination and a single Hull Cell test are required to control additives.

E—1109. Solvent for Ultrasonic Cleaning—A new industrial solvent for use with ultrasonic cleaning equipment offers selective solvency, electrical stability, rapid drying, safety and low unit cost. Developed by London Chemical Co., Inc., Sonic-Solve No. 113 has the power to remove contaminants without affecting plastics, decals, numbers, magnet wire, insulating varnishes, etc. The non-ionic, non-hydroscopic liquid is completely stable and safe for use with electronic cleaning equipment. After 10 seconds in an ultrasonic cleaner using Sonic-Solve, completely assembled open relays are devoid of rosin fluxes, oils, greases and dirt. Another five minutes in an ultrasonic dryer and the parts are ready for packing. It also dries rapidly in open air. No rinsing or neutralizing is necessary.

E—1110. Vapor Degreasing System—There are no extras to buy on the new, improved Aircon model 75 vapor degreaser. This economical degreaser is supplied as a complete unit, with a low level thermostat control and water flow interlock which prevents boil-out due to water supply failure. The unit is electrically heated on 220 or 440 v.

A working area of 38 by 22 in. and a vapor depth of 24 in. allows a load cleaning capacity from 600 to 900 lb of steel per hour. Suitable for trichlorethylene solvents—requires 16 gal in boiling sump, 24 gal in storage. Self solvent-distilling feature assures fresh solvent for spraying. Water consumption—30 gal/hr. Construction is of heavy gauge steel with a rust inhibitive interior coating. It is a product of Aircon Division, Armstrong & White, Inc.

E—1111. Stripping Compound—Buffing and polishing which normally represent major overhead costs when salvaging plating rejects, now can be circumvented with the development of a new flaky, light organic compound reported by Wagner Bros., Inc., for chemical stripping operations.

The development, when combined with sodium cyanide and dissolved in water, will strip plated deposits from ferrous-base metals without the use of electrical current. It is reported to remove copper, nickel: cadmium, zinc as well as silver, size of the part in no way hindering results.

The compound marketed under the trade name of Iso-Strip, according to the company, has a higher first cost than conventional electrolytic sulfuric acid or sodium nitrate strippers.

The following advantages are claimed: It does not etch the base metal; eliminates

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racking procedures—parts may be stripped in baskets or tumbled in barrels; no supervision is required and the stripping can be done at night, parts being ready for production the next day; and the chemical can be used in a cold state by simply increasing immersion time.

E—1112. Abrasive Wheel Disposable Flanges—Disposable flanges and a design that permits flush sanding are two major improvements in Minnesota Mining and Manufacturing Co.'s line of small coated abrasive PG (polishing and grinding) wheels for finishing and maintenance operations.

The new disposable flanges, which lock the wheel's coated abrasive leaves securely in place, are factory-installed and bonded to the core. This construction technique makes it unnecessary to remove the flanges when a wheel change is required; it's simply a matter of slipping the PG wheel on the spindle and tightening the cap nut.

The new flanges provide hub strength and are recessed into the side of the wheel. The end cap nut is also recessed, so that the wheel can be used flush against a surface, as in finishing a right angle or corner. The new recessed-type flange also allows the wheels to be ganged more closely to obtain a wider abrasive surface. The recessed flanges are available on all diameters of the small (6–10 in. dia.) PG wheel line, and on widths 1.5 in. and up.

E—1113. Plating Rack—The Plating Equipment Division of ARco (Automotive Rubber Company, Inc.), has developed a new type plating rack. ARco engineers state that they have incorporated versatility, simplicity, durability, and long life into the basic design of this new type rack, helping to reduce metal build-up on racks, drag-out losses, drag-in solution contamination, high maintenance, and product rejects.

Direct current conduction is provided from the hook to the piece-holding member without resistance joints. All rubber-to-rubber joints of the assembled rack are sealed with two ribs, one concentric to the other. The splines and other components of this new unit are completely covered prior to the assembly with a newly developed, molded thermosetting compound.

E—1114. Plastic Filter Pumps—The Sethco Mfg. Co. reports a new design and a number of additions to its line of all plastic filter pumps for filtering corrosive solutions with no leakage and with no metal contact. Filter will remove particles down to 1 in size.

The series consist of a plastic pump and a plastic filter chamber mounted on a linen impregnated phenolic panel and coupled to a totally enclosed, ball bearing ¼ h.p. motor (-30DT models have ⅓ h.p. motors). Hose supplied is vinyl or pure gum, heavy wall, with ID dimensions, commensurate with filter pump capacity.

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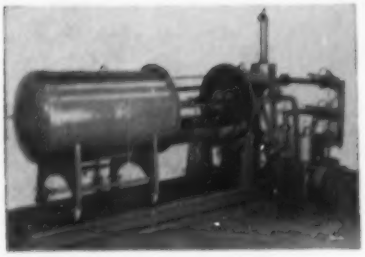


E—1115. Medium-Size Unit Vacuum Metallizer—A vacuum metallizing unit has been introduced by NRC Equipment Corp. to fulfill the need for a moderately priced, medium capacity vacuum coater which approaches the efficiency of NRC's large production units.

The Model 3143 industrial vacuum coating unit is for use where the volume of work is insufficient to utilize the capacity of a large production coater. It comprises a 5-ft long, 42-in. diameter horizontal coating chamber which provides 12,000 sq. in. of coating capacity per load. Two filament rods and a planetary jig which accommodates four work holding rods are cantilevered from the one head of the chamber which remains stationary. This arrangement eliminates flexible power and water connections and provides accessibility for charging the evaporating filaments and loading and unloading the work.

This system will exhaust an empty chamber to coating vacuum in less than 10 minutes. When fully loaded, the unit will process three to five batches per hour.

E—1116. Silver Alloy Flux—Krembs & Co. have perfected a silver alloy flux for aluminum bronze, beryllium copper, stainless steel, brass, inconel, nickel and a number of other metals.

This flux melts at 1160 F, and its range of efficient action is wide enough to produce good results with higher melting brazing alloys, such as AMS 4772 alloy with a flow point of 1575 F. The wetting action of this flux has been improved. It serves a wide field of applications, including various aircraft work and other processes where longer life is required.

E—1117. Phosphatizing Control Booklets—A new daily control booklet for three and five stage phosphatizing operations is being offered free by the DuBois Co. Inc., Industrial Division.

The booklet contains forms for record keeping for a complete month of phosphatizing operational checks. It makes it easy for the user to keep a record of titration, compound added to tanks, temperatures, etc.

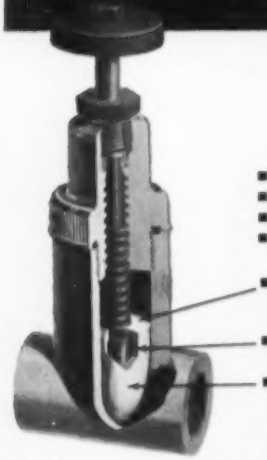
E—1118. All-Purpose Detergent—Kelite A-P-C (U. S. Process Patent No. 2,603,556), an all-purpose, concentrated, powdered detergent, has been developed by Kelite Corp.

One hundred per cent active, it reportedly contains no fillers of any kind. Kelite A-P-C has high sudsing and high suds-staying power and is safe on all commonly-found surfaces, including aluminum and durable painted surfaces.

It is used in a concentration of ½ to 4 oz. to a gallon of water, at a temperature range of 70 to 140 F, and is soluble in hot, cold, hard, soft, or saline water. It will not harm the hands.

E—1119. Corrosion Resistant Drums—A new line of corrosion-resistant drums and buckets, coated with Miccrosol vinyl plastisol, is announced by the Coating

NEW! ALL-PLASTIC GATE VALVE



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This is the first single source of reference for data and information on these processes. Provides a critical and authoritative review of the applications and techniques of vapor deposition of metals and non-metals.

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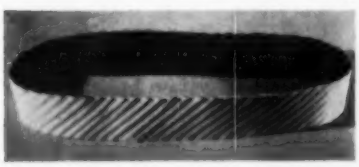
E—1120. All Plastic Gate Valve—The Vanton Pump & Equipment Corp., pioneers in the sealless plastic pump field has announced that it is making the first all-plastic gate valve specifically designed to meet the problems of conveying corrosive and abrasive liquids in lines that cannot be chemically contaminated.

Vanton has combined in its design of this new product, called the Flex-Plug gate valve, both the straight-through flow, non-pressure drop characteristic of a gate valve and the throttling, flow-control feature of a globe valve, allowing for wide versatility of application.



E—1121. Ribbed Felt Polishing Belt—Believed to be an innovation in polishing belt design, the new felt belt announced by Shaw Belting Co. features a ribbed construction which is said to offer improved polishing action, cooler running, excellent carrying of polishing agents and long wear. The ribbed design is claimed to result in cooler operation which decreases the possibility of burning or clouding. While rib surfaces become heated, areas between the ribs remain substantially cooler. The diagonal ribbed surfaces help the belt to follow difficult contours, especially on round or half-round shapes.

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L—1122. Chlorinated Hydrocarbons—A new, illustrated, twenty-page booklet which describes the properties and uses of five important chlorinated hydrocarbons has just been published by Stauffer Chemical Company. The publication contains complete technical data, e.g., typical analyses, solubilities, flash point and density tables and graphs, as well as other pertinent physical and chemical information, for perchlorethylene, trichlorethylene, carbon tetrachloride, methylene chloride and chloroform. One full section of the booklet sets forth optimum handling procedures and methods of minimizing waste.

L—1123. Titanium Anodizing Racks—A new four-page brochure, "J & F Titanium Gives Anodizing Racks New Life," describing the corrosion resistance of titanium in anodizing operations, has been published by Johnston & Funk Titanium Corp.

The 8½ x 11-inch brochure contains "on the job" photographs, illustrating the successful application of titanium to anodizing tips, and an all-titanium rack, in reducing corrosion attack.

L—1124. Line-operated *p*H Meter—A new issue of Photovolt Corp's. Bulletin No. 195 describes its line-operated *p*H meter Model 85 just placed on the market. Its scale is 3 in. long, covers the complete *p*H range from 0 to 14, and can be read to an accuracy of 0.1 *p*H unit. It can be furnished either with individual glass and calomel electrodes, or with "probe" electrode, i.e. combination glass-and-calomel electrode.

L—1125. Neoprene Data Sheet—The Protective Coatings Division of Metalweld, Inc., is making available to industry a new data sheet which lists the physical and chemical resistances of Neoprene sheet.

L—1126. Plating and Degreasing Baskets—The fabrications illustrated in Wiretex Manufacturing Co.'s new catalog M-7 represent a few of the wide variance possible, ranging from small baskets to hold jewelry parts to baskets to hold five tons. In addition to basket specifications and suggested uses, the catalog also includes information on how to order metal and alloy baskets for specific requirements.

L—1127. Plastic Metal Reinforced Tubing—A new type of reinforced plastic PVC tubing that has been flexed to an angle of 90° over 1½ million times without cracking or breaking and that will bend around a 5/16 in. diameter spindle without its internal bore being reduced is illustrated and described in a 2-color leaflet just released by Newage Industries, Inc. A sample of Bardex is included with the leaflet that describes how the tubing is weatherproof and resistant to gasoline, oils, high octane fuels and how it serves thousands of uses in modern industry because it is light in weight, will not kink, is self extinguishing, ideal as electrical conduit, acid resistant and has transparency.

L—1128. Polyvinyl Chloride Pipe—A 12-page two-color catalog available from Alpha Plastics Inc. describes the firm's regular and high impact corrosion-resistant rigid polyvinyl chloride pipe.

Included are tables of pipe sizes, specific chemical applications, physical properties, temperature factors for various working pressures, support spacing and thermal expansion.

Flow charts, installation instructions, pipe characteristics and fields of application also are included.

L—1129. Crystal Lattice Models—Crystal lattice models of chemical ele-

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ments, compounds, minerals, and alloys are listed and illustrated in a 6-page La Pine descriptive bulletin. Angles and dimensions of models are based upon data obtained by X-ray and electron diffraction. Bulletin describes basic school sets and models for advanced study. These three-dimensional models are used in industrial research laboratories as well.

L—1130. Electric Heat for Plating Baths—Publication GER-1333, four pages, is a technical article by a General Electric author giving basic criteria for selection of tubular heaters for plating baths. Includes information on installation, insulation, power requirements, and maintenance.

L—1131. Chemical Process Manual—A 16-page manual, describing in detail 57 chemical processes that take place daily in over twelve thousand metal-working plants, has been issued by Turco Products, Inc. Printed in three colors, the illustrated manual also includes nine reference charts applicable to the industry.

Among the chemical processes discussed in the manual are: Cleaning, phosphating, conversion coating, protective coating, paint and carbon removing, rust removing and preventing, descaling, electroplating, inspecting, processing aluminum and maintaining of paint departments and other plant facilities.

Reference charts included in the manual are: Conversion factors, decimal equivalents, measuring surface areas, tank capacities, Fahrenheit-Centigrade conversion chart, phosphating reference chart, table of drop in air pressure, energy required to heat water and properities of saturated steam.

L—1132. Anodes and Plating Chemicals—A new 12-page, two-color bulletin offered by Hanson-Van Winkle-Munning Co. describes and illustrates their full line of anodes, anode accessories and chemicals for electroplating and metal finishing.

Specifications and recommended applications are given for seven styles of anode bags, three types of diaphragms and eight types of anodes. The bulletin describes a number of salts commonly used in electroplating baths and 13 brighteners used in H-VW-M solutions. It also lists the standard package sizes for these products.

L—1133. Magnetic Carrier—A new illustrated bulletin is offered by the manufacturer of Magne-Carrier, the magnetic way of carrying parts along on overhead conveyors. According to the producer, the new system completely eliminates clamps, hooks and other positioning and attaching methods and employs magnetic principles for conveying parts through processing operations.

L—1134. Rectifiers—Selenium, germanium and silicon rectifiers for electroplating, anodizing and all electrochemical processing are described in a new bulletin available from Frederic B. Stevens, Inc.

The warranty and features of the Stevens-Walker Twin-W rectifier line are covered as well as descriptions of the Stevens line of rheostats, line switches and a periodic-reverse plating unit.

L—1135. Thickness Gages—The Amnico Filmeter and the Magne-Gage are completely described in a bulletin made available by American Instrument Co., Inc. It includes technical measurement information and technical data on both of these coating thickness gages. The Magne-Gage measures metal coatings on iron and steel and nickel coatings.

L—1136. Vacuum Metallizing—A 24-page brochure offered by F. J. Stokes Machine Co. called Vacuum Metallizing describes the uses of this process, gives the materials and properties of vacuum metallized coatings, and shows advantages of the methods.

L—1137. Dust Collectors—Hammond Machinery Builders Inc. has just issued a new catalog, No. 815, featuring its DusKolector and MistKolector. An outstanding feature of the DusKolector units is that they can be used with dirt and mist

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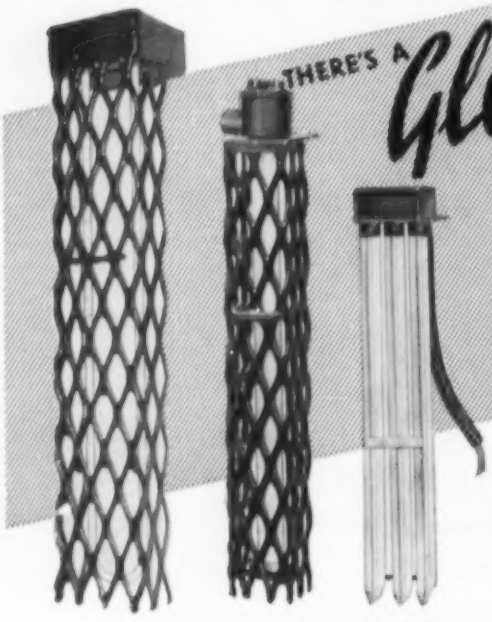

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producing machines that are located too far away to be connected to a central collecting system. They require little floor space and often can be fitted into existing space without rearranging machines.

L—1138. Demineralizer Bulletin—The L'A Water Softener Co. has available a new 8-page technical bulletin on the subject of Demineralizers. Although the Bulletin 108-A is written for layman comprehension, it covers completely the technicalities of demineralization.

A step-by-step explanation, including formulas is given for the "run" of demineralization and the regeneration process. The Bulletin explains the internal arrangements and operation of the basic types of demineralizers used for varying water requirements, discussing also the availability of several different types of valve and control arrangements from individual manually operated, to complete automation.

L—1139. Powdered Acid and Reverse Current Cleaner—The properties and uses of Oakite Drycid, the recently introduced powdered acid scale and rust remover, are described in a service report published by Oakite Products, Inc.

The service report points out the convenience inherent in shipping, storing, and using a powdered rather than liquid acid; the lack of acid fumes; and the material's increased safety on various metals. One of the major advantages discussed is Drycid's greater safety when used to descale systems containing dissimilar metals.

In another service report the use of Oakite Composition No. 90 for reverse current cleaning of steel before plating is described.

The report explains how the composition was carefully formulated to combine the properties desirable in a reverse current cleaner: high conductivity, superior smut removal, controlled foaming, and long life in solution.

L—1140. Portable Filter—A two-page bulletin which pictures and describes its compact new Dincalux portable filter for a wide variety of plating solutions is being offered by the Hanson-Van Winkle-Munning Co. Measuring only 12 in. in diameter and 28 in. high, the unit has 3.5 sq ft of filtering area and a capacity of 900 gph free flow and 600 gph with carbon charge.

Bulletin DF-100 gives complete specifications and lists all the important features of the filter. Characteristics of the special Perspex plastic casing for visual inspection while operating and a list of the many solutions it will handle are also included.

L—1141. Story of Chemicals—Depicting in word and picture its diverse, growing family of chemical products for industry and agriculture, Diamond Alkali Company, Cleveland, Ohio, has just published the fifth edition of *The Story of Diamond Chemicals—Chemicals You Live By*.

Highlighting the contributions of Diamond organic and inorganic chemicals to building a better America through chemical progress, this newly revised and enlarged, 32-page booklet presents a panoramic picture of these basic materials, their principal applications, and their production in a style and format which are both interesting and informative to technical and non-technical readers.

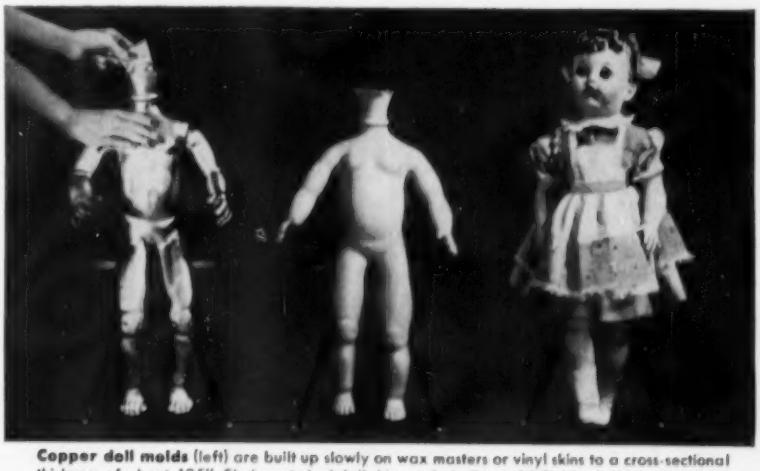
Major products or product-groups discussed in digest form are: soda ash, caustic soda, chlorine, chlorinated methanes, bicarbonate of soda, sodium silicates, calcium carbonates, chromates, specialized chemicals, organic chemicals, plastic, cement, coke and coke by-products, and agricultural chemicals.

L—1142. New Automatic Plating and Anodizing Machine—A new fully automatic plating and anodizing machine is described in an 8-page bulletin just issued by Lasalco, Inc.

Using just one man, the Cycleflex reportedly produces up to 240 racks per hour when arranged with double-lane plating or anodizing unit. Operation is from a single control panel.

L—1143. Work Gloves—The Granet Corp., manufacturer of coated fabric work gloves, announces the publishing of a new catalog describing in detail the industries and uses of their six different lines, each designed for specific applications.

The photographs and the physical property and chemical resistant charts will help in the determination of the best glove for a specific application.



Copper doll molds (left) are built up slowly on wax masters or vinyl skins to a cross-sectional thickness of about .125". Slush-cast vinyl doll skin made in the mold. Finished doll at the right.

"Plus-4" Anodes make superior molds for slush-casting vinyl doll skins

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3. "Plus-4" Anodes give a smooth build-up on the mold, without treeing—and have superior throwing power, giving a better plate on the hard-to-reach surfaces of the mold.

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The Iron Age, *180*, No. 8, August 22, 1957, p. 108–111.

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A. Roll.
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The Structure of Electrodeposited Alloys. X. Gold-Copper Alloys. E. Raub and F. Sautter. Metalloberfläche, 1956 (A), 10, (3), 65–72.

The Behaviour of Cast, Rolled and Electrolytic-Nickel Anodes in Various Types of Nickel-Plating Baths. H. Offermanns, H. v. Feld, S. Kalbitzer and W. Schröder (Metalloberfläche, 1956, (B), 10, (1), 22–23. A study of the behaviour of the following types of Ni anodes: cast, containing Cu 0.10, Fe 0.51 and Mn 0.14 per cent; rolled, containing Cu 0.05, Fe 0.16, and Mn 0.15 per cent; and electrolytic, containing Cu trace, Fe 0.04 per cent, and Mn trace, in dull- and bright-Ni plating baths. The following data are tabulated: bath composition, *p*H and temperature; c.d.; operating time; loss in weight of anodes; Ni content of anode slimes; per cent loss of Ni in slimes; amount of Ni passing into solution; anode current efficiency. Although it is often said that cast anodes dissolve the most easily, rolled anodes less easily, and electrolytic anodes with difficulty, no differences in behaviour were observed in these baths with high-Cl contents. Slime formation varied; electrolytic anodes gave a slime consisting mainly of Ni spangles; rolled anodes and, more especially, cast anodes gave large amounts of brown-black slime which with cast anodes tended to be colloidal and become partially entrapped in the electrodeposit. Ni slime losses, expressed as a per cent of the loss in weight of the anodes were: 0.4–1.2, 0.6–1.9 and 3.9–6.6 with electrolytic, rolled and cast anodes, respectively.

The following is a metallurgical abstract taken from The Journal of the Institute of Metals, February 1957, p. 505. (Address: 17 Belgrave Square, London, S. W. 1).

Short-Time Tests with a New Corrosion-Test Chamber. W. Hess. (Werkstoffe u. Korrosion, 1955, 6, (7), 325–328)—The salt-spray test is well established as a short-time corrosion test, but it is necessary to standardize the conditions of the test. In particular the fineness of the spray can affect results. Sprays from nozzles are unsatisfactory for several reasons. A new method of producing a mist has been developed in which the test liquid is thrown centrifugally from a spinning plate and broken into a spray from which the coarser particles are separated cyclonically. The resulting mist is led into a transparent chamber which can be heated. Aggressive gases can be led in with the mist. The advantage of the apparatus is good reproducibility; the aerosol is uniform and the mist concentration is the same at all points in the chamber. The appearance of several steel and Zn-coated specimens, and a lacquered Pb specimen after treatment is described.

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England

Iron Age
Chestnut & 56th Sts
Philadelphia 39, Pa

J. Electrochemical Society
1860 Broadway
New York 23, N. Y.

J. Institute of Metals
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London, S.W. 1, England

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PERSONALS

Ey Jr.

Smith

Herman A. Ey Jr., is the new manager of cleaner sales for Hanson-Van Winkle-Munning Co. His headquarters will be in Grand Rapids, Mich., at the company's midwest cleaner plant.

Formerly president of Mido Products, a chemical cleaning products firm in Torrance, California, Mr. Ey has had extensive sales experience in the chemical cleaner field.

He has been on the sales staffs of Sundmark Supply Co. and the Kelite Products Corp. of Los Angeles, and Scobell Chemical Co. of Rochester, N. Y.

Mr. Ey is a member of the American Chemical Society, the AES, the Chemical Market Research Group, and the organization of Southern California Chemical Salesmen. He attended DeVaux Military School and studied engineering at the University of California, Los Angeles.

Gail A. Smith, well known throughout the country as author and "trouble-shooter," became Wyandotte Chemicals, J. B. Ford Division, Minneapolis District sales manager October 1.

Carl Dover, who has been Wyandotte Chemicals, J. B. Ford Division, Minneapolis manager since 1950, requested early retirement because of ill health.

Mr. Smith graduated from Michigan State University in 1938 and then obtained a Masters degree from Ohio State. His nine years with the Detroit Board of Health was broken by four years Air-Force service—was a major when discharged.

William E. Glidden, formerly founder and president of Glidden Coating Co. in Pitman, N. J., has recently become associated with Metalweld, Inc., Protective Coatings Division.

Mr. Glidden brings to the Philadelphia firm over 20 years of experience in corrosion and contamination control—and the application of protective linings and coatings.

Prior to forming his own company in 1948, Glidden was associated with Metallizing Engineering Co. as a development engineer and a sales engineer.

He is a member of the American Welding Society, the National Association of Corrosion Engineers and the Society of the Plastics Industry.

Robert Brown is new sales representative in Michigan for Heil Process Equipment Corp., of Cleveland, Ohio, manufacturers of chemical-proof tank and tank linings, lead anodes, fume scrubbers, heat exchangers, solid plastic hood and duct systems, acid-proof maintenance materials, axial and centrifugal fans. Mr. Brown will be located at 2970 West Grand Blvd., Room 218, Detroit 2, Mich.

Lewis M. Walker has been elected president of U. S. Metal Coatings Company, Elizabeth, N. J., succeeding **Alex. B. Carver,** who becomes chairman of the

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board. U. S. Metal Coatings Co. electroplate chromium, copper and nickel on industrial machinery for the process industries.

Harvey E. Bland has been appointed manager of the technical service department of The Diversey Corporation, Chicago, manufacturer of sanitation chemicals for the food, dairy and metal processing industries. Mr. Bland attended Iowa University and Iowa State College, majoring in chemistry.

George H. Williamson has been elected vice president in charge of West Coast activities for American Chemical Paint Co., Ambler, Pa. including their plant at Niles, Calif.

Mr. Williamson has been associated with the company since 1935, specializing in the sales of rustproofing chemicals and processes for the metalworking field.

Mr. Williamson's new responsibilities will include supervision of all the American Chemical Paint Co. activities, sales and service of metalworking and agricultural chemicals and processes, and manufacturing at Niles.

Ellsworth A. Stockbower has been appointed manager of new product sales in the Metalworking Chemicals Division of the American Chemical Paint Co.

Mr. Stockbower joined the ACP research laboratory staff in 1947. In 1951, he was made metalworking chemicals technical service manager in the sales department and was promoted to manager of the technical standards department in 1953.

Kenneth C. Brownell moves up to chairman of the board from president of American Smelting and Refining Company. **R. Worth Vaughan** becomes president; **Oscar S. Straus** has been elected chairman of the finance committee. Retiring are **Roger W. Straus,** board chairman, who will remain as a director; and **John C. Emison,** finance committee chairman.

Two new management directors and a new company vice president were also elected. **R. D. Bradford,** vice president, and **Forrest G. Hamrick,** who has also been made treasurer, are directors. **Kershaw Harms** is a vice president.

Willard D. Clark has been appointed district sales representative in the New England area for The Pfaudler Co. of Rochester, N. Y., manufacturers of glassed steel process equipment.

A graduate chemical engineer from Northeastern University, Mr. Clark has more than 15 years experience in sales and sales engineering. Mr. Clark will conduct joint sales activities with **M. J. Goodwin** from Pfaudler's Boston area office, Needham Heights, Mass.

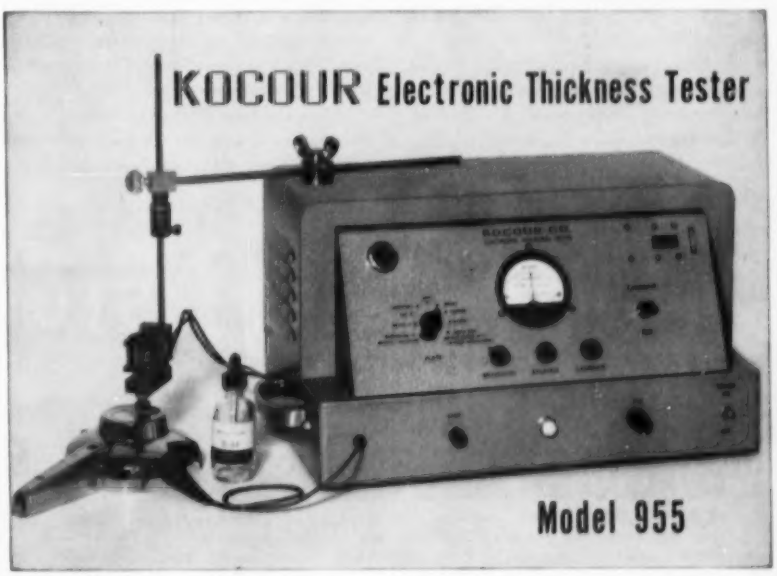
Robert H. Schwaig has been appointed sales representative in the St. Louis, Mo. area for Pfaudler.

A licensed professional engineer in Missouri, Mr. Schwaig is a chemical engineering graduate of the Missouri School of Mines and Metallurgy, Rolla, Mo. Before joining Pfaudler in December 1956, he had been associated in engineering and sales capacities with Industrial Process Equipment Co., Olin Mathieson Chemical Corp., and Merck & Co. He is a member of the St. Louis chapter of Alpha Chi Sigma and American Institute of Chemical Engineering.

William A. Hopkins has been named manager of The Electric Auto-Lite Company's Bumper Division at Sharonville, Ohio. Mr. Hopkins, a native of the Cincinnati area, was associated with Auto-Lite from 1934 until 1943 when he joined the Manhattan Project during World War II as a consulting engineer on electroplating and metal cleaning problems. His appointment fills the vacancy created by the recent death of former Auto-Lite vice president, C. L. Lancaster.

While studying metallurgical engineering at the University of Cincinnati, Mr. Hopkins joined Auto-Lite as a student engineer in the Lamp Division at Cincinnati. Later he was named chemist at the Auto-Lite plant in Woodstock, Ill. At the time Mr. Hopkins joined the Manhattan Project, he was consulting electroplating engineer for the company's eight metal finishing plants.

Since World War II, he has gained a wide background in the metal finishing industry. Most recently he was associated with the Bart Manufacturing Corp. of Newark, N. J., and associated companies as vice president, manufacturing. He is a member of the AES.



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Coapman

Radtke

Arthur H. Coapman, Wilbert M. Radtke and **Homer H. Welch** have been selected as the new Cowles Chemical Co., Cleveland, technical men servicing Cowles alkaline metal cleaners and Ty-Bond zinc phosphate metal coatings.

Mr. Coapman has been selected to handle the sales and services of Cowles Products in Detroit and nearby cities. He has had considerable experience in the plating business having owned and operated a plant in Minnesota.

Mr. Radtke will be in charge of the sales and services in Indiana, making his headquarters in Indianapolis. Mr. Radtke has had experience in the metal finishing trade for the past 8 years.

Mr. Welch will handle the sales and services in outstate Michigan. He has had 13 years experience in the plating business in Jackson, Michigan, where he will make his headquarters.

Welch

Howe

Dr. Arnold P. Howe has been appointed to the newly created post of assistant to the president of Michigan Chrome and Chemical Co. Dr. Howe joined Michigan Chrome over a year ago and has concentrated on product development, facility expansion and departmental organization in the Chemical Division.

He received his PhD in chemistry from Purdue University. He spent several years with Shell Chemical Co. in research, manufacturing, product development, market analysis and sales and was general manager of Lefflingwell Chemical Co. of California.

Raymond A. Barry, formerly chief chemist of Electric Auto-Lite Co., Cincinnati, O., was recently appointed a sales engineer for the Cincinnati district by Wagner Brothers Inc., Detroit.

A graduate chemical engineer from the University of Cincinnati, Barry brings to Wagner more than 11 years of experience in metal finishing and electroplating operations.

Edwin E. Stalo has been appointed Indiana representative for Klem Chemicals, Inc. of Dearborn, Michigan, manufacturers of chemicals for metal surface prefinish cleaning.

Fred Johnson has been named sales engineer of MacDermid Incorporated, Waterbury, Conn. He has been assigned to assist Cecil Thornton covering the New York State area from Rochester, New York.

Mr. Johnson, former sales engineer for Wagner Brothers, Inc., and chief chemist for Hickock Manufacturing Co., is a graduate of the University of Rochester and

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Rochester Institute of Technology. He is an active member of the AES and served as secretary of the Rochester Branch for the past two years.

Johnson

Dargis

Raymond G. Dargis has been assigned as technical sales representative in the Detroit area for MacDermid Western Inc., Ferndale, Mich.

A graduate of Tufts College with a BS in chemistry, Mr. Dargis formerly served as chief of the By-Products Division of American Smelting and Refining Co., San Luis Potosi, Mexico. Since then he has been with Pratt & Whitney Aircraft Corporation in the Metallurgical and Chemical Processing Group.

Gene Chapdelaine has been named vice president of the Conversion Chemical Corp.

Mr. Chapdelaine joined Conversion Chemical a little over a year ago and has been active in product research and marketing. Prior to that he served first as chemist and later as supervisor of the finishing department of the Underwood Corp., Hartford, Conn.

Mr. Chapdelaine was educated at the University of Bridgeport and is a member of the AES.

Chapdelaine

Cunningham

Lawrence W. Cunningham has been promoted to Southern Region sales manager by Kelite Corp. Mr. Cunningham joined Kelite in September 1956, as Dallas, Texas, district sales manager. Prior to his appointment, he was associated with Oakite Products, Inc.

He will be in charge of sales in Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas and part of Kansas and Missouri. He will make his headquarters in Beaumont, Texas, his home city.

Frederick W. Fink has been named chief of the Corrosion Research Division at Battelle Memorial Institute.

Mr. Fink has specialized in corrosion studies, particularly those related to nonferrous metals and stainless steels, since first joining the staff in 1938.

The Battelle technologist has been active with the Gordon Conference on Corrosion conducted by the American Association for the Advancement of Science, serving on various occasions as discussion leader and, in 1951, as chairman. In 1952–53, he was chairman of the Corrosion Division of the Electrochemical Society. More recently (1955–57), he headed the National Association of Corrosion Engineers' Technical Practices Committee T-3. He is currently serving as chairman of the education symposium scheduled for the 1958 annual meeting of NACE in San Francisco.

J. C. Bessonette has been appointed Texas area representative for Lasalco of Texas, Inc. The new office and warehouse are located at 2805 Allen Street, Dallas. Mr. Bessonette has been with Lasalco, Inc., Saint Louis, for 14 years.

Chester L. Lancaster

Chester L. Lancaster, age 53, Electric Auto-Lite Company Vice President and Manager of the Bumper Division at Sharonville, Ohio, died recently in Cincinnati, Ohio.

Mr. Lancaster joined the old Corcoran-Brown Lamp Division at Cincinnati in 1927 as a student engineer. In 1935, he was transferred to the Woodstock, Illinois Plant as a Chemical Electroplating Engineer and in 1937, he was named manager of the Bumper Division. Mr. Lancaster was named a Vice President of the Company in 1950.

A native of Hamilton, Ohio, Mr. Lancaster is survived by his wife, Frieda, and two daughters; Nancy and Patricia.

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PATENT ABSTRACTS

(Continued from page 1211)

No. 2,790,738, 4/30/57—Titanium Descaling Process—H. Alexander and H. Farrell, assignors to E. I. duPont de Nemours and Co., Wilmington, Del.

The process consists of (1) contacting the titanium workpiece with a fused alkali metal hydroxide containing sufficient titanium (0.2–5 per cent) to repress adsorption of hydrogen by the work piece and (2) subsequently removing the reduced scale from the workpiece.

8 claims.

No. 2,790,739, 4/30/57—Coating Core Plates—W. Frederick and O. Romig, assignors to U.S. Steel Corp., N. J.

To increase the surface resistivity of ferrous magnetic stock apply a thin film of a phosphate slurry (300–900 grams of a Al or Mn phosphate and 50–110 ml 85 per cent H_3PO_4 in a liter of water) having a particle size of less than 8 microns and heat in an oxidizing atmosphere 400–1500 F to dry and react the phosphoric acid with the stock surface.

3 claims.

No. 2,793,992, 5/28/57—Electrical Cutting and Grinding—H. Heuser, assignor to General Motors Corporation, Detroit, Michigan.

A wheel of aluminum oxide particles bound together by a metal conductor is made the cathode and the work the anode in a pulsating direct current circuit of 10 to 30 volts at 300–360 asf while a thin film of an aqueous sodium carbonate-sodium silicate solution is caused to be formed on the grinding wheel operated at a pressure of at least 30 psi against the work.

2 claims, 3 figures.

No. 2,795,518, 6/11/57—Corrosion Resistant Treatment for Steel, Zinc, and Aluminum—J. Carroll and N. Mewhard, assignors to American Chemical Paint Co., Ambler, Pa.

Treat with an aqueous acidulated solution of chromic acid and a fluorine compound (fluosilicate, fluoborate, fluozirconate, fluostannate, fluotitanate). The chromic acid concentration being 0.3 to 10 g/l and the fluorine content 0.1 to 10 g/l and the proportions such that the *p*H is between 1.3 and 4.0.

15 claims.

No. 2,795,540, 6/11/57—Electrodeposition of Nickel—H. Brown, assignor to The Udylite Research Corp., Detroit, Mich.

A bath for electrodepositing a lustrous nickel consists of an aqueous solution of nickel chloride, nickel sulfate or mixtures thereof, containing an alkoxy coumarin having not more than 2 carbon atoms in the alkoxy group which is located on the coumarin nucleus in a position at least as high as 5. The amount is given as 0.05 g/l to saturation and a number of specific compounds are described in various claims.

20 claims.

No. 2,796,334, 6/18/57—Etching Aluminum—D. Robinson, assignor to Aluminum Company of America, Pittsburgh, Pa.

A process for etching aluminum consists of immersing the work

(Continued on page 1235)

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INTERSOCIETY NEWS

ASTM Technical Photographic Exhibit

The American Society for Testing Materials will hold its 12th technical Photographic Exhibit in conjunction with its 61st Annual Meeting and 13th Exhibit of Scientific and Testing Apparatus and Laboratory Supplies at the Hotel Statler, Boston, Mass., June 23–27, 1958.

This biennial exhibit has become one of the foremost technical photographic shows in the country. Entries will be accepted from all members of the American Society for Testing Materials and from employes of company members.

Classes of photographs to be displayed are: General, Photomicrographs and Electron micrographs. Black and White, Color Prints and Color Transparencies will be shown. Special attention will be given to the sections on photomicrography and electron micrography. To be accepted, entries must be informative in their particular technical field.

Further information regarding conditions of entry and applications may be obtained from E. W. Walsh, chairman, ASTM Photographic Exhibit, The Narragansett Electric Co., 15 Westminster St., Providence, Rhode Island, or the Headquarters of the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa.

Palik Represents Platers at Senate Committee Hearing

In a statement presented to the United States Senate Select Committee on Small Business in New York, October 2, John Palik Jr., president of the National Association of Metal Finishers, recommended as tax structure innovations: 1) institute a fair, graduated tax (similar to suggestions in Sadlak Herlong bills); 2) charge off capital investments—new equipment, etc. —in an amount over $25,000; 3) broaden the provisions for profit sharing and pension plans; 4) extend death tax; 5) liberalize depreciation for used equipment.

On the subject of purported Government competition with job shop platers, Mr. Palik criticized instances where the Government is alleged to be loaning money to contractors to set up new plating and finishing installations, particularly in the missile program.

"The Government could save the taxpayer a lot of money if it would give metal finishing work to the already established shops," he said "instead of paying to set up facilities for contractors."

Another complaint of the NAMF centers around Government-owned and -operated metal finishing shops which Mr.

TECHNICAL PROCEEDINGS AVAILABLE FOR ORDER

The 1957 Edition of TECHNICAL PROCEEDINGS covering every technical paper delivered before the 44th Annual Convention of the American Electroplaters' Society held in Montreal, Canada, June 17-20, 1957 is nearing completion. Watch PLATING concerning notification of availability. Meantime, copies of the 1956 Edition may still be ordered.

Containing each of the 42 papers delivered before the 1956 AES Annual Convention, together with their charts, diagrams, graphs, tables and other illustrations, and with the verbatim discussion that followed their delivery, TECHNICAL PROCEEDINGS broadly enriches technical and scientific knowledge in the field of electroplating, metal finishing and allied arts. It totals 308 pages compared with the 1955 Edition's 255 pages.

Orders for copies will be accepted and serviced by the American Electroplaters' Society on strictly a first-come, first-served basis so long as its limited supply lasts.

The domestic cost of the book is $12.50 per copy including postage. To those ordering it from outside the United States' continental limits, the charge is $15 per copy including postage cost. All orders must be accompanied by payment in full to obviate unnecessary bookkeeping expense.

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Palik says is in further competition with the job shop plating industry.

"We can understand how the Government might deem it feasible and necessary to operate small shops for experimental purposes," he said, "but to award contracts to Government-operated armories and other United States establishments when the same jobs could be done less expensively by private metal finishing firms, is not only poor business but imposes a heavier burden on taxpayers."

Protective Coating Papers at NACE Symposium

Papers on protective coatings and application techniques will be given in a 4-paper symposium at the November 12–14, 1957 meeting in Pittsburgh of the Northeast Region, National Association of Corrosion Engineers. Three other papers on coatings will be given in other symposia.

Considered will be surface preparation, steam resistant coatings, protection of power plants, evaluation and design factors important in coatings life. A wide variety of information in several industrial areas will be given.

Sessions will be held in the Penn-Sheraton Hotel. The social program includes the annual regional banquet.

Water and Air Pollution on Plant Maintenance Agenda

New topics to be introduced at the ninth Plant Maintenance and Engineering Conference in January, reflect the rapidly changing aspects of maintenance in the nation's factories. Prevention of air and water pollution and the impact of automation on maintenance top the list of subjects to be discussed.

The conference, one of the largest engineering meetings of the year, is held annually during the first three days of the Plant Maintenance and Engineering Show, which is set for the International Amphitheatre, Chicago, January 27–30. L. C. Morrow, consulting editor, "Factory Management and Maintenance," is general chairman of the conference.

There will be a new session devoted to the small-sized plant where less than ten employes are engaged in maintenance work. The pollution session will consider both outdoor pollution which causes serious community problems as well as in-the-plant pollution which raises costs, interferes with employe health and comfort, and impedes quality control.

Ten industries, including metal, will have separate sessions devoted to their respective problems.

Opportunity to Authors

Authors of technical and scientific papers on electroplating, metal finishing and related arts are cordially invited to submit manuscripts of original, unpublished papers to the Editor of PLATING for review and publishing consideration.

Any such paper accepted and published in PLATING will also be eligible, of course, for selection by the Society's Paper Awards Committee for the Carl E. Heussner Award; AES Silver Medal; AES Bronze Medal; George B. Hogaboom Memorial Award; Robert S. Leather Mechanical Finishing Award; Chromium Plating Award; Precious Metal Plating Award, or the John J. Hanney Memorial Award.

Though the submission of any such papers by AES members or non-members will be welcomed by PLATING any time during the year, this current period is particularly recommended. So as to expedite review and other processing, please write the Editor, PLATING, 445 Broad Street, Newark 2, New Jersey, for full particulars before submitting your manuscript.

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PATENT ABSTRACTS

(*Continued from page 1232*)

for ¾ to 2 min. in a bath of 0.5 to 2 per cent hydrochloric acid, 1 to 10 per cent sodium chloride and 0.06 to 0.2 per cent of bivalent copper, all by weight, at 70–100 C.

See also No. 2,796,335 with 3 claims by same inventor describing the use of nitric acid (0.2 to 0.6 per cent) instead of hydrochloric acid.

2 claims.

No. 2,796,337, 6/18/57—Abrasive Wheel—A. Block, assignor to Merit Products, Inc., Culver City, California.

A method of forming a grinding wheel of a large number of rectangular abrasive leaves is described.

4 claims, 3 figures.

No. 2,796,338, 6/18/57—Metal Blasting Material—R. Haberl, assignor to Buyresche Berg; Hutten-and Salzwerke, A.kt. Ges. Munich, Germany.

A material for blasting consists essentially of spherically smooth surfaced metallic grains (95.62 per cent Fe, 0.8 per cent Si, 0.6 per cent Mn, 0.8 per cent P, 0.08 per cent S, 2.1 per cent C) and rough surfaced metal grains (95.12 Fe, 1.2 per cent Si, 0.4 per cent Mn, 0.1 per cent P, 0.08 per cent S, 2.1 per cent C, 0.5 per cent Ni and 0.5 per cent Cr). The smooth grains constitute 20–50 per cent of the mixture.

15 claims.

No. 2,796,361—Method for Corrosion Protecting Articles—A. Chester, assignor to Poor and Company, Chicago, Ill.

The corrosion resistance of a zinc-copper alloy (5–30 per cent copper) articles overplated with chromium may be improved by treating with an aqueous solution of chromic acid and hydrochloric acid having a *p*H of 0.75 to 1.75.

See also No. 2,796,369 with 6 claims issued to the same inventor for nitric and chromic acids.

4 claims.

No. 2,796,336, 6/18/57—Descaling Metals—G. Carter, assignor to E. I. duPont de Nemours and Company, Wilmington, Delaware.

The article is immersed in a molten alkali metal hydroxide to which has been added 0.3–10 per cent by weight of an oxide of an alkali metal, about 0.3–20 per cent of an alkali metal hydride and about 0.2–10 per cent of an acidic iron compound.

10 claims.

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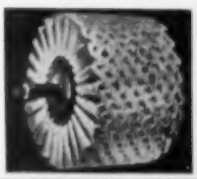

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BRANCH NEWS

Total AES Branches U. S., Canada, Australia, October 1, 1957—57.

BRIDGEPORT

Brassard Made Branch Honorary Member

The regularly scheduled business meeting and Educational session of the Bridgeport Branch, AES was held in the Main Ballroom of the Hotel Barnum on Friday, September 13, 1957. President **Floyd Tatum** called the meeting to order. Thirty-six members and guests were present. Two applications for membership were read. President Tatum appointed **E. Bergen** to head the Olde Timers Nite Committee. The Branch's secretary has been invited to be a member of the Branch Secretaries' Committee, appointed by the president, **Francis T. Eddy,** to aid in solving the problems caused by the recent change in the fiscal year. **Mederick Brassard,** past president, was elected an honorary member of the Branch. George Eckholm won the door prize.

Theodore Voyda, chief chemist of the Hubbard Hall division of Apothecaries Hall Co., was the featured speaker of the evening. His topic, "A Discussion of Anodes", was clearly presented and understood.

At adjournment, refreshments were served and the viewing of the current Friday night fight was enjoyed.

Bob Parker
Secretary-Treasurer

BRITISH COLUMBIA

Future Meetings Outlined; Electroplating Course Starts

The first meeting of the 1957–1958 season of the British Columbia branch, AES was held at the White Sport Restaurant, Sept. 17, 1957.

Secretary **Jim Lee** mentioned proposed October and November meetings as well as a possible tour of the Britannia Mines for the last meeting of the season in the spring.

Walter Kellerman gave an outline of the electroplating course to commence on Oct. 1 at Vancouver Technical High School. There will be 24 evening sessions.

Reg Irwin was elected director to replace **Sid Storer** who has left the organization.

Stan Lucas showed slides taken at the Inaugural Meeting of the Branch last spring, followed by interior shots taken by **Bill Marquardt** of his shop, Hudson Plating Co.

The main speaker of the evening, Dr. **Saltonstall** of the Udylite Corporation, Detroit, was introduced by Bill Marquardt, president; and he spoke on various aspects of nickel plating. His talk included a short history of nickel plating up to the present, with conjecture as to what we could expect in the future. He mentioned the corrosion research being carried on in the automotive field in industrial atmospheres, including reference to corrosion cells of chrome and nickel and corrective steps being taken.

Jim Lee
Secretary

BUFFALO

Technical Question Box Success; Saubestre at Opening Meeting

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Buffalo Branch, AES opened its new season with a new group of officers, a buffet dinner which was a huge success, and a most interesting and enlightening talk by **Dr. Edward Saubestre,** engineering specialist, Sylvania Electric Products, Inc., Electrochemical Research Laboratories, on "The Atomizer Test—A New Degreasing Evaluation Test." Dr. Saubestre received his PhD in chemical engineering as an AES Fellow on Project 12 (Cleaning) which many have enjoyed reading in PLATING magazine. Participation by the group in the discussion following the talk attested to the high caliber of presentation, keeping everyone alert and attentive.

One of several new features incorporated in the Branch's program is a "Technical Question Box" headed by **Frank Rudolph,** first vice president, and a panel of five experts. The enthusiasm with which it was received was evidenced by **Fred Goeckel,** president of the Branch, having to call time as the half hour allotted did not permit the completion of discussion on the second question.

Our new librarian, **Harold Shapiro,** has lined up a challenging and interesting program for the lecture part of the monthly meetings.

The Buffalo Branch holds its monthly meeting the first Friday of each month at the Niagara Manor located on the Niagara Falls Blvd. near Sheridan Drive, with the exception of the Oct. 4 meeting which will be held at the Town Club, Jamestown, N. Y. and the January meeting will be held Jan. 10, instead of Jan. 3, to give us time to recuperate from the holidays. The get-together time is 6:30 p.m. with dinner —dutch treat—at 7 p.m., followed by the business session at 8. Visiting after the meeting as long as your purse or constitution will permit.

If you are interested in plating and live in our area, we'll sign you up, or if you are in Buffalo on our meeting night, look us up and introduce yourself. We will surely make you welcome.

Ralph D. Stemmerich
Secretary

CAPITOL DISTRICT

Visit Made to Watervliet Arsenal

The September meeting of the Capitol District Branch was held at Panetta's Restaurant in Menands, N. Y. on Sept. 9. President **Robert Wolf** reported on the highlights of the National Convention. **Ed Frieberg** was named chairman of the Christmas Party Committee to repeat last years happy success of the same event.

The June clambake was reported as being both enjoyable and profitable, as a small balance was shown after the clams, chicken and other refreshments had disappeard and the sportsmen and card players were happily wending their way homeward. Other transactions of the shortened business meeting, were the report by Librarian **Arthur Eisner** on the scheduling of **John P. Nichols,** executive secretary of the Society, for our Oct. 7 meeting, and a joint meeting, Nov. 4 with the National Association of Corrosion Engineers. On events to come, talks on phosphate coatings and on barrel plating have been scheduled for early 1958. A request from **Dave Day** for transfer of his membership from our Branch to the Mohawk Valley Branch was received.

After the short business meeting, we adjourned to the Watervliet Arsenal, where a guided tour of the electrofinishing facilities, under the direction of Branch member, **Robert Hill** of the Arsenal and his associates, **Ted Pochily** and **Frank Dashnaw,** was enthusiastically received by our group. It was a very enlightening experience to see great lengths of gun barrels chromium plated inside or out to close tolerences. Processes and problems encountered were explained as well as some of the research and development

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techniques applied at the Arsenal. We are indeed indebted to Mr. Hill for arranging and conducting such an educational event for our Branch.

John H. Green
Acting Secretary

CHICAGO

Morse First Speaker of Season

The first meeting of the 1957–1958 season was held on Friday, Sept. 6, 1957 with a good attendance of members. The following meetings are scheduled for the first Friday of each month. After the social and dinner hour, **Joseph C. Corre,** librarian, introduced the speaker of the evening, **Leland Morse** of the Chrysler Corporation. Mr. Morse is a University of Michigan graduate and has been with the Chrysler Corporation for 17 years. He is in charge of the Engineering Plating Laboratory facilities whose function is to watch the quality of products submitted and the setting up of specifications for metal finishing.

Mr. Morse gave a paper on the "Testing of Electrodeposits On Samples of Production" as supplied by the vendor. Chrysler does very little plating, the bulk of plating is done by approved sources on the Chrysler list. Samples from vendor's production are sent to the laboratory and the acceptance or rejection of the entire lot will depend on the outcome of the laboratory tests.

The samples as supplied by the vendor are tested in the laboratory for the following requirements; (1) thickness of plate (2) appearance and workmanship (3) ductility and adhesion (4) dimensional tolerances (5) Salt Spray Test. Mr. Morse pointed out that the "Corrodkote" test is more reliable for evaluation of plated deposits than the usual Salt Spray Test. With the use of slides, he discussed the methods of measuring thickness of plate, the methods for testing adhesion and ductility, the testing of finished parts to outdoor exposure, and the specifications for salt spray for finished steel parts and anodized aluminum parts. The talk was very interesting and an informative question and answer period followed.

Christopher Marzano
Publicity Chairman

CINCINNATI

Membership Goal Set; Prize to Best Recruiter

The Sept. 25, 1957 meeting was called to order by President **Loveless** with 37 members and guests present.

The membership committee reported that they held a meeting and came up with the following plan. A goal of at least 30 new members has been set. The committee plans to send out letters to prospective members and then follow-up on each letter. It was pointed out to all members that the Branch will pay for a guest's dinner, and that every member should do his best this year. A transistor radio will be awarded to the person who has brought in the most new members by the February meeting. In addition, there will be a door prize awarded at every technical meeting this year.

It was pointed out that all address corrections or changes should be brought to the secretary's attention.

The 1958 Picnic Committee was appointed: **Earl Leonhardt,** chairman, **Albert Jacobs** and **Chuck Wallace.** The picnic will be held in June.

The librarian reported that plans for this year's meetings have just about been completed.

Samuel Goldberg of the Department of the Navy talked on "Hydrogen Embrittlement in Steel." It was pointed out that the hydrogen can be introduced into the steel during its processing. Steels which show a Rockwell C 40 or greater are heat treated at 350 F for four hours to remove the hydrogen. Failure of parts due to hydrogen embrittlement can be very serious, and therefore the problem is of great importance to the Navy Department. After a question and answer period, the meeting was adjourned to the social hour, sponsored by MacDermid Co., **Bill Gordon** acting as host.

David L. Kaplan
Secretary

COLUMBUS

Rohr Speaks on Cleaning Techniques

The regular monthly meeting of the Columbus Branch, AES was held at Cenci restaurant on Friday, Sept. 6, 1957.

The business meeting was called to order by President **Calvin Smith.** Four new members were elected.

Delegates **Nat Koslin, Bill Safranek** and **Bill Neill** gave reports on the important events at the 1957 AES National Convention held at Montreal last June.

Librarian **Jack Spenard** introduced the speaker of the evening, Dr. **Robert J. Rohr** of Magnus Chemical Co. whose subject was "Present Uses and Latest Improvements in Cleaning Techniques." Dr. Rohr gave an interesting talk on different types of cleaning equipment.

Following a round of applause for the speaker, **John Beach** presented the pesky problems that had been mailed in. After an interesting session in which the plating problems were presented and discussed, the meeting was adjourned.

Halvor S. Christianson
Secretary

DAYTON

Past Presidents Honored; Dayton Has Provided Four National Prexies

The Dayton Branch opened the new season with a dinner meeting honoring the Past Presidents of the Branch. The meeting was at the Biltmore Hotel, Sept. 18, and 40 members and friends were present. Thirteen out of sixteen of the known living Past Presidents were in attendance. The old records have been lost and we hope that we did not slight anybody. Every known method was used to trace the records with no avail.

The Dayton Branch is proud that four, present or former, members of the Branch went on to become Supreme Presidents of the Society. Three of these are still living, and we had hoped to have all of them for speakers. They are **C. L. Van Derau, C. C. Conley** and **W. J. Neill.** Mr. Van Derau could not attend due to ill health. Mr. Conley and Mr. Neill, though, did provide us with a very interesting evening. Mr. Conley reviewed the past of the Society and the Branch and Mr. Neill gave us some interesting thoughts on what may be in store for the near future. In addition each Past President said a few words as he was introduced. It was a very enjoyable evening.

Since many have indicated a desire to know who the Past Presidents are, we are listing them:

1913 to 22—Walter Fraine
1922 to 24—Robert Suman

1928 to —Thomas Cusick
1930 to 31—William Hohman

1936 to 37—Charles Abbott
1937 to 40—Charles Conley
1940 to 42—E. W. Cochran
1942 to 43—C. W. Powell
1943 to 45—W. J. Neill
1945 to 47—Walter Moline
1947 to 48—Frank Klein
1948 to 49—Herman Austen
1949 to 51—Elmer Rehme
1951 to 52—R. Clinefelter
1952 to 53—Fred Bauch
1953 to 54—R. M. Clinchens
1954 to 55—John Easton
1955 to 56—Ralph Collins
1956 to 57—R. L. Ruleff

R. M. Clinchens
Secretary

DETROIT

Twenty New Members; New Branch Handbook Completed

The "kick-off" meeting of the 1957–58 series was held at the Statler Hotel on Sept. 6. It was the first general meeting back at "the old stamping grounds" after a year's sojourn at the Sheraton Cadillac Hotel and was attended by approximately 125 members.

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Prior to the opening of the meeting by the new Branch President, **Glenn H. Friedt Jr.**, an excellent color film "Fly, Fisherman, Fly" was presented and enjoyed by the members of this "Water Wonderland" Branch.

Twenty new applicants for membership were introduced by Secretary **Edward Kubis** and were elected. Mr. Kubis also announced that, in accordance with Society Bylaws, all delinquent members as of Sept. 1 are suspended, but outlined the only requirement for re-instatement is payment of dues. Chairman of the Board of Managers, **Fred Olmstead,** installed the Branch Delegates comprising **Herb Head, Cleve Nixon** and **Walter Pinner.**

Walter Pinner gave a brief report on the convention held in Montreal and announced that Boston had been selected as host of the 1961 convention.

Mr. Friedt announced that a new publication, the "Detroit Branch Handbook", 1957–1958, has been completed and is ready for distribution to all branch members. He commended the committee on turning out such an excellent job in so short a time and said "This handbook resulted from a recommendation made by Mr. Cleve Nixon, chairman of the Forward Planning Committee of the Branch, and is a result of hard work by a special committee headed by **Manuel Ben.** In addition to Mr. Ben, this committee was composed of Messrs: **Bigge, Drinkwater,** Head, Kubis, **Lewis, McAleer, Morse, Mueller,** Nixon, **Olmstead, Thomas** and **Wilson,** and this booklet is a result of their teamwork and cooperation. Special mention also should be made of the valuable assistance the committee received from **Al Bohn** of the Administrative Engineering Department, Research Staff, General Motors Corp.

The December Party report was given by Chairman **Carl Durbin** which included a proposed new method of party ticket distribution based on requisition by each member.

Fred G. Low, E. I. duPont de Nemours and Co. Inc., of Wilmington, Delaware, the evening's guest speaker, was introduced by James "Doug" Thomas, educational chairman. The subject presented by Mr. Low was entitled "Metal Cleaning —Methods and Cost Analysis." A most useful booklet was handed to each member in attendance, which fully covered various types of metal cleaning methods and described in complete detail the means of ascertaining cleaning costs. Mr. Low elaborated upon and explained the many facets encountered in a cost analysis of this type. The interest generated by the speaker was illustrated by the lively question and answer period which followed at which time the speaker was assisted by a panel composed of the following: **Harry Hansen,** Dupont Detroit district manager, **John Hitchcock,** DuPont sales representative and **P. L. Baske** of G. S. Blakeslee Co. of Chicago.

An announcement was made that an electroplating course will be conducted at Mumford High School, Detroit, commencing September 17 and the course instructor, **John Strandburg,** was introduced. Mr. Strandburg described the course, its objectives and the approximate tuition fees.

The next meeting will be held on October 4, 1957, and our own Walter Pinner will be the guest speaker. The subject for this, The Branch Members' Night, will be "A Report of ASTM Activities on Performance of Plated Coatings."

Robert J. Amis
Publicity Chairman

HAMILTON
Teal Heads New Slate of Officers

The first meeting of the season was held in the Hamilton Room of Fischer's Hotel, Hamilton, Ont., Friday Sept. 20, 1957.

With elections as the highlight of the evening, President **W. Finlay** called the meeting to order at 8:30 p.m.

The following members were elected to office for the year 1957–58. President, **B. Teal;** secretary, **R. McLeod;** first vice president, **J. Edwards;** treasurer, **E. Cranfield;** librarian, **K. Taylor;** recording secretary, **D. Darby.**

Upon retiring from office, W. Finlay thanked the members for their cooperation and extended the best of wishes to Mr. Teal and his incoming executives for the next year.

Refreshments were served and a well-attended meeting adjourned at 11 p.m.

D. Darby
Recording Secretary

Photo courtesy: Hanson-Van Winkle-Munning Co.

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. . . Against Corrosion, Contamination, Abrasion

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HARTFORD

Miller Speaks on Chemical Milling

The regular Branch meeting was held on Sept. 16 at the Bond Hotel and 57 members and guests were present. Preceding the meeting **Joseph Loersch** presented "New Developments in the Plating Field." Through the courtesy of the Bell Telephone Co. a movie in color entitled "Crystal Clear" was shown.

The guest speaker for the evening was **Ned Miller** of Turco Products, Inc. whose subject was "Chemical Milling."

Mr. Miller stated that chemical milling is a means of removing metal by a controlled etching method using acids and alkaline materials for such metals as aluminum, magnesium, titanium and steel. Chemical milling has engineering and economical advantages. Engineering design advantages are: greater strength per unit weight ratio, can be done after forming operations, used on complex parts, contours, etc., permits design not possible by other methods and closer tolerances can be held. Economical advantages: use of non-skilled labor, many and varied parts can be done at the same time, no other finishing is required, low rejection rate and no expensive machinery or tooling is required. Colored movie showing this process was also shown.

The technical chairman for the evening was **Walter Dyber.**

Stanley Platoz
Secretary

INDIANAPOLIS

Eight New Members; Invitation Extended for Interim Meeting

On Sept. 4 twenty-six members and guests were present at Fox's Steak House to start the 1957–58 Indianapolis AES program. The meeting was opened by our president **Bert Hawhee** with the usual introductions.

Les Reynolds gave us a satisfactory report of the Tri-State finances which will give the Louisville Branch a good start in '58. **Roman Bender** made a motion, seconded by Herb Kennedy to accept the complete Tri-State report.

John Hood called to our attention that the Scientific Achievement Award has increased in value.

Bert Hawhee appointed **Quentin Shockley, Elmer Lundberg** and **John Vaughan** to serve on a committee to see if Indianapolis Branch has a suitable candidate.

Marshal Whitehurst reported that **Dr. Max** is willing to reopen an electroplating class under Purdue Extension if enough applicants enroll. The course fee is $45.

Eight applications for new members were presented and accepted.

After considerable discussion, **Ed Bruck** made a motion to postpone the election of delegates for the 1958 convention until November.

Les Reynolds made a motion to authorize **Ed Bruck** to notify National Headquarters that Indianapolis Branch will extend an offer to have an Interim Meeting at Indianapolis.

Quentin Shockley moved to accept **Addison Howard's** and **L. R. Rogers'** offer to write a paper on "Practical Aspects of Tin and Tin Alloy Plating." The motion was seconded and carried.

Bert Hawhee presented a past president pin to Marshall Whitehurst.

Addison Howard presented **Robert T. Gore** of Metal and Thermit Corp. Mr. Gore's subject was "Practical Aspects of Tin and Tin Alloy Plating." Since more are interested in tin alloy plating our speaker started in on plating techniques of nickel alloy with acid solutions of 65–35 percentage. The chief advantages are very good corrosion resistance, outstanding throwing power, and parts can also be barrel plated. Tin-cadmium in borate solution displays outstanding corrosion resistance. Tin-zinc is used for excellent solderability of parts and for general outdoor hardware protection due to the galvanic protection of scratches or pores on steel due to the zinc.

Bronze or tin-copper has about as many uses for decorative purposes as it has for undercoat purposes for marine uses. All present learned many items about tin-alloy plating from Mr. Gore, to whom we are grateful.

Paul Freeman
Secretary

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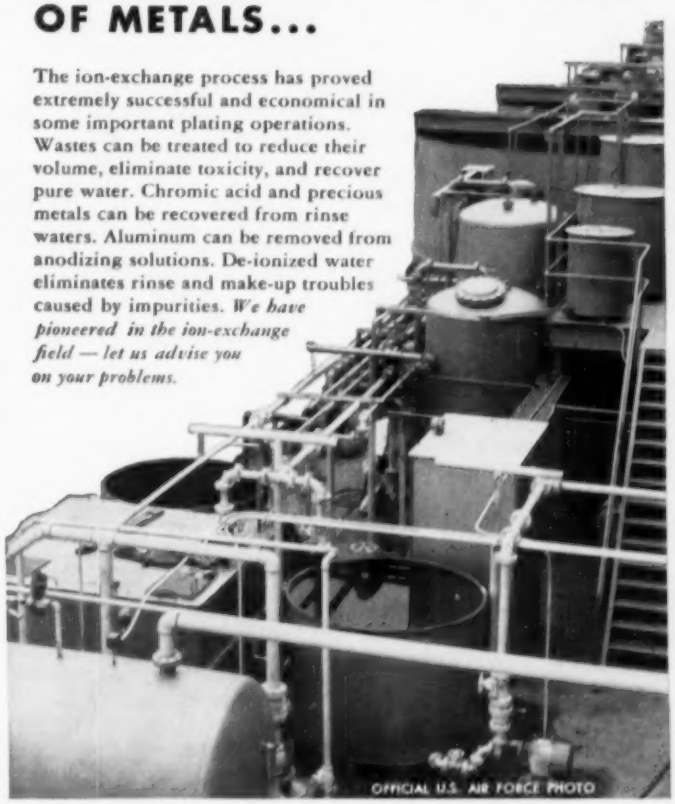

FOR FURTHER INFORMATION, USE READER SERVICE CARD; INDICATE A 1174.

KANSAS CITY

Branch Bylaws to be Prepared

The Kansas City Branch AES held its regular monthly meeting Thursday, Sept. 12, 1957 at the Berkshire Hotel. After a delicious family-style chicken dinner, the meeting was called to order by President **George Becker**. Eighteen members and four guests, two of whom later became members, were present.

This meeting being the first one held by the new officers since their election, last spring, President Becker properly removed **Glen Wilson** from the chair by investing him with a Past President's pin. By a vote of the Branch, the secretary was directed to order similar pins for the other four Past Presidents for presentation at the October meeting.

R. E. Loupee, who was elected librarian at the regular election, tendered his resignation from that office due to increased business duties. His resignation was accepted with regrets, President Becker declared the office vacant and proceeded to conduct an election. **Scott Sterrett** was elected and in accepting, he asked for suggestions for program subjects. A number of ideas were offered and Scott promised an interesting and diversified program for the year.

A report was heard of the National Convention, including the changes in the Constitution and Bylaws. Scott Sterrett, **Everett Copeland,** and **R. L. Garrett** were elected Delegates, and **Herb Clark, R. E. Lee** and **Milo Sawyer** were elected Alternates.

President Becker appointed **Cecil Barton** chairman of the Membership Committee, with **R. C. Garland, William Mumma** and R. E. Loupee.

Discussion was had regarding the problems of dinner reservations at the meetings. It was finally decided to continue with mail notices with a telephone response, except for fifteen who made a standing reservation unless they cancel in advance of the deadline.

Upon motion by **Bill DesJardins,** a committee was appointed to draw up and submit at the next meeting, a set of Bylaws for the Kansas City Branch.

Robert L. Garrett
Secretary

LANCASTER

Murray Talks on Printed Circuits; Delegates Elected

Our first meeting of the new season took place at the Hanover Country Club on Sept. 13, 1957. An excellent meal, arranged through the assistance of **Ed Biemiller** was served to 39 members and guests.

A short business meeting presided over by President **Curvin Miller,** resulted in the election of delegates and alternates as follows: **George Lefever, Chester Smith** and **Joseph Shockor** as delegates, with **William Klunk, Edward Biemiller** and **Robert Plaisted** as alternates. Two applications for membership were presented along with several requests for application blanks. Plans were formulated for our annual Ladies' Night to be held at Middletown, Pa., on Oct. 13, 1957.

An interesting talk by **William Murray** of the Enthone Company on "Printed Circuits" with slides was well received and provided an interesting discussion period.

R. S. Plaisted
Secretary

LOUISVILLE

Badaluco Talks on Buffing and Polishing

The regular monthly meeting of the Louisville Branch, AES was held Thursday, Sept. 19, 1957 at Hasenhour's Dining and Cocktail Lounge. Twenty-six members and guests were present.

Our meeting began with a minute of silence in memory of our past secretary-treasurer, **Joseph G. Sterling,** who passed away on Aug. 24, 1957.

A new member was elected.

President **John S. Houston,** conducted election of delegates and alternates. The following were elected:

Delegates—**Harlan D. Bowsher, John S. Houston, Kenneth C. Reifsteck;** alternates—**Stanley J. Beyer, Duke T. Scott, Frank E. Wilcher.**

There being no further new business the meeting was turned over to the program chairman, Kenneth C. Reifsteck, who announced that our October meeting would be Ladies' Night with all wives invited. Mr. Reifsteck then introduced our speaker, **James A. Badaluco,** manager of buffing compound sales, Hanson-Van Winkle Munning Co.

Mr. Badaluco gave a very interesting talk, supplemented by colored slides, on the subject of "Buffing and Polishing." He discussed the use of Tripoli as an abrasive, and told us how this product was mined and then used as a base for many different types of buffing compounds. He pointed out the different abrasive and oil absorbtion qualities of various buffing compounds, and indicated that automatic equipment is causing a trend toward liquid buffing compounds.

Frank E. Wilcher
Secretary-Treasurer

MIAMI

Patton Discusses Plating Waste Disposal

The July 31 meeting was called to order by President **Dent** with 21 members and guests in attendance.

"Duke" Dent introduced the speaker of the evening, **Vincent D. Patton,** sanitary engineer in the Sewage and Industrial Wastes Section of the Florida State Board of Health. Mr. Patton gave a very informative talk on the "Disposal of Plating Wastes." His subject matter covered primarily types of waste encountered, toxicity of same, and means for their disposal. He emphasized the need for good housekeeping in the plating shop. This latter he pointed out is a money saver as well as an efficiency measure. Further, he stated that where recovery of used chemicals is possible, such recovery is without question to be preferred over neutralization or conversion and then disposal; this from the standpoint of overall, long term economy.

A. F. Newlander
Secretary

MIAMI

Future National Convention Discussed; Will Join Southeastern Annual

Following an excellent roast beef dinner at Jerry's Restaurant the Aug. 28 meeting was called to order by President **Dent.**

Membership was discussed and the need for increasing the membership stressed. Mr. Dent brought up the subject of National Conventions and the possibility of holding one in Miami in the future was discussed. The ultimate suggestion taken into consideration was the recommendation that all branches be contacted by letter regarding their feelings on having such a convention in Miami. There will be future discussions on this matter. The president then read a letter from the Southeastern Branch asking the Miami Branch to join with them in their next Annual Technical Educational Session. Following discussion it was decided that the president should write to the South Eastern Branch agreeing to participate in the manner they should desire.

A letter from **A. Korbelak** of the Sel-Rex Corp. concerning his proposed visit to Miami on Oct. 30 to address the Miami Branch was read.

A. F. Newlander
Secretary

MILWAUKEE

Outdoor Meeting at Racine

On Friday Sept. 6, 1957 the Milwaukee Branch, AES held its Annual Racine Meeting. Traditionally this is the opening event of the year and is anticipated with delight by the membership. This year the meeting was a festive outdoor event held at Memorial Park near Racine, Wisconsin. The outdoor frolic began at 2:00 p.m. with sports and games for everyone. At 6:30 p.m. the ravishing appetites of the membership were satisfied by delicious food served outdoor style. This was followed by entertainment and the distribution of numerous prizes to lucky members and guests. The membership gave a rising vote of thanks to the following Racine area members of the committee who arranged for the good time:

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R. Olsen, chairman; **R. Toeppe, W. Heinen, P. Beardsley, W. Runge, A. Svoboda, J. Vogel, R. Goodsell, K. Olsen, S. Audenby, R. Strommen, E. Rhinehart.**

The 481st regular meeting of the Milwaukee Branch was called to order by President E. H. McCoy at 8 p.m.

Three applications for membership were presented to the Board of Managers for action.

Notice was given of special elections for the office of second vice president and a two-year term on the Board of Managers to be held at the next regular meeting. The nominating committee presented **T. Sobczynski** as a candidate for second vice president and **Edward Weiss** as a candidate for Board of Managers. The slate was left open for further nominations from the floor.

S. Taterzynski
Secretary-Treasurer

MONTREAL

Reisenburg Speaks on Polishing; Davidson Makes Convention Report

The meeting on Sept. 11, 1957 was opened in the usual manner by president **P. M. Coady** with 28 members present.

Librarian **J. Rennie** introduced the speaker for the evening **J. T. Reisenburg Sr.** Mr. Reisenburg's subject was "Methods of Polishing" which he treated in great detail.

After a very interesting talk he answered questions put to him by the members.

After a short recess the meeting proceeded to the business session.

Six applications for membership were read and approved.

Report on the Convention was given by **G. R. Davidson.** From his preliminary report it would appear that we have managed a very successful Convention.

Motion by J. T. Reisenburg Sr. seconded by **N. Cronin** that a committee be appointed by the president to select a suitable gift for Mr. and Mrs. Davidson in appreciation of their outstanding effort toward our convention.

Report on the Dance given by N. Cronin promises another bang-up party for all who attend.

Delinquent members to be contacted once more and if not paid up by Sept. 15 they are to be suspended.

W. T. Scott
Secretary-Treasurer

NEWARK

Lux Discusses Phosphate Coatings

President **William Grigat** called the Sept. 20, 1957 meeting of Newark Branch AES to order after **Howard Cobb** presented the International Nickel Co. film "Corrosion in Action."Ninety members were present.

Four membership applications were received and 10 visitors introduced. **John Banta** moved and it was passed that **Roy Stout** be elected an Honorary Member of the Branch.

Robert Ehrhardt, chairman of the nominating committee presented the same candidates for election as Delegates and Alternates as last year in accordance with the June Supreme Society action requiring such election at the first meeting after the Convention. Delegates elected are **Don Foulke, George Wagner,** and **Andrew Wesley.** Alternates are **Dodd Carr, Robert Horrocks, Gerald Lux.**

Gustave Bittrich as chairman of the Membership Committee reminded the group of our success last year and asked for continued effort. He also asked for a show of hands as to interest in forming an Organic Finishing Section. About as many were for it as against, so all membership will be polled by ballot in the next Sparks. Gus Bittrich as chairman of the Banquet Committee reported this activity well under way with a meeting having been held the previous Wednesday.

Librarian **Fred Meyer** then introduced **Connie Corsini** who presented some lovely color slides of his shop, Independence Plating Company, taken as part of a documentary film and some of which may appear in the Encyclopaedia Brittanica.

Gerald Lux then spoke on the "Fundamentals of Phosphate Coatings." He covered the history of these coatings, and the present uses and properties of phosphate coatings on steel. There are three types: iron, zinc and manganese phosphates.

The modern iron phosphate bath gives coatings of 30–100 mg/sq in. usually used as paint base for indoor applications. With no pre-clean usually necessary and a relatively thin coating formed, the process is inexpensive.

Zinc phosphate coatings are much thicker, 100–600 mg/sq in. for painting and 1000–2000 mg/sq in. for lubrication, require pre-clean and are more costlier to use. However, for best quality work the thicker films are necessary.

Mr. Lux pointed out that organic finishing should follow phosphating as soon as possible and stressed the need for thorough rinsing after phosphating and the need for sealing the phosphate coatings.

After the talk a number of questions attested to the interest, after which beer and refreshments were enjoyed, with many taking time to view the photomicrographs of phosphate coatings provided by Oakite's laboratory.

D. Gardner Foulke
Secretary

NEW HAVEN

Electroplating Course Starts; Harper Talks on Buffing and Polishing

The first meeting of the '57–'58 season

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1—8000/4000 AMPERE, 6/12 VOLT, **CHANDEYSSON**, Synch.
1—7500/3750 AMPERE, 9/18 VOLT, **HANSON-VAN WINKLE-MUNNING**, Synchronous.
1—6000/3000 AMPERE, 6/12 VOLT, **ELECTRIC PRODUCTS**, Synch.
2—5000/2500 AMPERE, 9/18 VOLT, **CHANDEYSSON**, Synchronous. Exciter-in-head.
1—4000/2000 AMPERE, 6/12 VOLT, **H-VW-M**, Synch., Exc.-in-head.
4—3000/1500 AMPERE, 12/24 VOLT, **CHANDEYSSON**, Exciter-in-head.
1—2000/1000 AMPERE, 6/12 VOLT, **HANSON-VAN WINKLE-MUNNING.**
1—1500/750 AMPERE, 12/24 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.

ANODIZERS

1—1000 AMPERE, 40 VOLT, **CHANDEYSSON**, 25/C.
1—1000 AMPERE, 30 VOLT, **IDEAL**, Exciter-in-head.
1—750 AMPERE, 60 VOLT, **HANSON-VAN WINKLE-MUNNING**, Synchronous, Exciter-in-head.
1—500 AMPERE, 25 VOLT, **CHANDEYSSON**, Synchronous, Exciter-in-head.
4—400 AMPERE, 40 VOLT, **M. G. C.**, Separately Excited.

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1—**GREEN SELECTOPLATER**, 1800 AMPERE, 12 VOLT, 220/3/60.
1—**SEL-REX** SELENIUM, 1200 AMPS., 9V, for 440/3/60.
1—**UDYLITE-MALLORY**, 1500/750 AMPERE, 6/12 VOLT.
4—**UDYLITE-MALLORY**, 1440/720 AMPERE, 6/12 VOLT.
1—750 Amp., 6 V **RAPID** Selenium, Remote Control, 440/3/60 AC.

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1—**STEVENS** Semi-Automatic for Cyanide-19 ft. by 4 ft. by 30 in. deep.
2—**RONCI** Enamelers, No. R-100 & R-200.
1—**ALMCO** DB8 Deburring Barrel, 2 Comp. Vari Drive.
1—**ALMCO** DB-2 Deburring Bbl., lined.
1—**HAMMOND** VRO, 7 Variable Speed Buffing Lathe, 7— HP.

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was held Tuesday, Sept. 10 at Mason Laboratory, Yale University. The speaker, John Harper, president of Harper Buffing Machine Co. gave a very interesting lecture on the development and use of automatic buffing and polishing machines.

Edward F. Foley gave a report to the branch on the Electroplating Course which the branch sponsors at New Haven College. The fall section of this course "Electroplating Practice" will start on Sept. 23 and continue for 15 weeks.

The president, **Leo F. Roberti,** appointed the committees to serve for the '57-'58 season. The following chairmen were appointed:

Educational, **Frederic E. Allen;** Research, **Edward F. Foley Jr.;** Welfare, **Harry Taylor;** Membership, **Charles Kuster;** Entertainment, **Edward F. Busby;** New England Regional, **Leo F. Roberti;** Publicity, **William K. Murray.**

E. F. Foley Jr.
Historian

NEW YORK

Speakers Announced for Annual Educational Session

The New York Branch of the American Electroplaters' Society will hold its Annual Educational Session and Banquet Feb. 1, 1958 in the Penn Top of the Hotel Statler. The Technical Session will be held in the afternoon at 2:30 p.m.

Educational chairman **Arthur Carlson** has arranged an outstanding program:

RESEARCH IN ELECTRODEPOSITION IN PROGRESS AT THE NATIONAL BUREAU OF STANDARDS by **Dr. Abner Brenner,** director, Electrochemicals Div., National Bureau of Standards, Washington, D. C.; RECENT DEVELOPMENTS IN BRIGHT LEVELING NICKEL DEPOSITS by **Dr. Myron Diggin,** technical director, Hanson-Van Winkle-Munning Co., Matawan, N. J.; SEEING PLATING SOLUTIONS IN ACTION by **Dr. Walter R. Meyer,** president, Enthone, Inc.

John Melhado, chairman of the Ladies Program, is busy arranging a party for the women which will really keep them entertained while the men are attending the educational session.

Dick Hartman, chairman of the Entertainment Committee, is again lining-up an outstanding floor show, which will follow the banquet. As usual, a fine orchestra will supply the music for dancing throughout the evening.

Derick Hartshorn Jr.
Publicity Chairman

PHILADELPHIA

Wesley Delivers Honorary Members Memorial Lecture

The first meeting of the 1957-58 season was held at the Engineers' Club of Philadelphia on Monday, September 30. Fifty-six were at dinner and eighty-four at the

PREVIEW OF FUTURE PLATING ISSUES

●

JANUARY 1958

ABRASIVES AND MECHANICAL FINISHING. Third annual issue of this popular yearly feature.

●

MARCH 1958

ORGANIC COATING. Like last year's edition, this issue will feature organic finishing.

●

APRIL 1958

TECHNICAL RESEARCH. Not only will this issue spotlight recent developments in the AES Research Program but will also be the pre-1958 ANNUAL CONVENTION feature issue.

●

MAY 1958

CONVENTION ISSUE. Inasmuch as the 1958 Annual Convention will be held in Cincinnati, Ohio, May 19-22, this feature issue will come in May instead of June as customary.

●

JULY 1958

POST CONVENTION ISSUE. Among other features, it will contain a pictorial and narrative account of the 45th Annual Convention.

●

AUGUST 1958

WATER AND WASTE TREATMENT. Another edition of this informative and popular feature.

meeting. At the start of the meeting each one introduced himself. Reports from the various 1957 Banquet committee chairman indicated the affair to be well into the final planning and arranging stage. **Dr. Samuel Heiman** was nominated as the Philadelphia Branch selection for the Philadelphia Outstanding Engineer Award for 1958 Engineers' Week. The secretary read communications and announcements of other Branch meetings. Four applications were received and referred to the Board of Managers.

The feature of the meeting was the Honorary Members Memorial Lecture delivered by **Dr. W. Andrew Wesley,** AES third vice president and manager of research, Research Laboratory, International Nickel Co. Before starting his formal talk on "Nickel-Chromium Deposits," Dr. Wesley described briefly the first Executive Board meeting he attended, in Detroit during September. He announced that the Interim Meeting would be held in Indianapolis.

At the start of his talk, Dr. Wesley said a more suitable title would be "What we *don't* know about nickel-chromium coatings." The most important problem is porosity. Two generations of chemists have been trying to explain this vexing question with the answer still in doubt. A key question has been what happens to a nickel-chromium deposit before rust appears. Nickel will not corrode in the absence of moisture. Porosity as evidenced by permeability of thin coatings to hydrogen does not appear to be the answer, since very thin deposits, too thin for reasonable protective value on steel, are impermeable.

The fogging of nickel in atmospheres of 70 per cent or more relative humidity, appears to be a key to the corrosion of nickel. At 70 per cent relative humidity sulfur dioxide in the air causes a catalytic reaction which leads to the formation of traces of sulfuric acid as one of the corrosion products.

While nickel corrosion loss is very low in rural and marine atmospheres, it is nonuniform. In marine atmosphere corrosion tests of wrought versus nickel plated foil showed the wrought foil to be far superior to electroplated foil in lack of perforations due to corrosion, while in normal atmospheres, both foils had about the same number of perforations.

Tests were made with nickel foils that contained measured amounts of impurities. The weight losses from corrosion were about the same, excepting the sulfur containing foil, which showed a markedly higher weight loss. (Sulfur is a constituent in several bright nickel addition agents.) However, when examined for perforations, iron (4.9 and 7.4 per cent) showed none, sulfur — 374, 0.2 per cent lead — 218, no measured impurities — 101, other impurities about equal to that obtained with 0.05 per cent cobalt — 66.

Dr. Wesley also gave results made with 0.00002 in. chromium plated over similar nickel foils. Chromium plated over dull nickel gave better perforation results than plated over bright nickel. Plated over nickel that contained measured amounts of impurities, chromium protected for a while, then broke down completely.

Shown were slides illustrating: stress in the deposit has a great effect on the way chromium fails; different corrosion patterns, which may be varied with different impurities and deposition conditions. For the future, Dr. Wesley said that further study should be made of factors influencing pitting patterns. ASTM Committee B4 has shown that a thicker chromium coating of 30 — 60 millionths inch is better than thinner coating in normal use. This committee has also shown that multiple nickel layers are giving better corrosion resistance. International Nickel is working on the behavior of other metals in combination (copper under nickel); however, the copper corrosion products are corrosive.

Following Dr. Wesley's excellent lecture, Branch President Farren welcomed Dr. Heiman's electroplating class of 25 at the meeting and extended them an invitation to attend future Branch meetings.

William Trusdell spoke of the Honorary Members of the Philadelphia Branch, living and deceased, who had contributed so much to the advancement of the Society and the Branch. He expressed the hope that we would be able to extend to more members the honor of Honorary Membership.

I. Wm. Marcovitch
Secretary

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ELIMINATES COMPOUND WASTE
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ROCHESTER

Magnesium Finishing Presented by Kimmel

The September meeting of the Rochester Branch AES was held at the 40/8 Club House and called to order by First Vice President **Roswell Minard.**

Business matters discussed were: the death of AES member **Thomas Campbell;** the proposed change in meeting place and change in meeting date to be voted upon at the next meeting; the New York State Regional Committee appointments and the election of the following delegates and alternates for 1957–1958 fiscal year; delegates—**L. Morrison, E. Wallin, F. Beuckman** and alternates—**W. Tucker, R. Flint,** and **J. Hull.**

The librarian, **Lorrin Cornell,** introduced the speaker of the evening, **Charles Kimmel** of the Dow Chemical Co. Mr. Kimmel presented a very interesting talk concerning magnesium finishing including conversion coatings, anodic coatings and plating of magnesium alloys. He illustrated his talk with 35 mm slides.

Linwood P. Morrison
Secretary-Treasurer

SAGINAW VALLEY

Sports Night Celebrated

The Saginaw Valley Branch held their first 1957–58 meeting at Zehender's Hotel in Frankenmuth, Michigan on Sept. 11, 1957. Seventy-two members and guests were present for sports night.

E. A. Brisson, president, opened the meeting following dinner. Four new members were voted into the society.

L. C. Mangett introduced **Boyd Williams** of the Williams Gun Sight Co., our guest speaker. His subject, "African Trophies", included film showing record-class trophies taken in the green highlands of East Africa.

C. Brunette won the door prize donated by the J. J. Siefen Co.

P. A. Waskevich
Recording Secretary

SAN FRANCISCO

Saltonstall Talks About Chrome Plating

Regular monthly meeting was held at International Inn, South San Francisco, Sept. 12. Attendance 33. We were honored by the presence of **Dr. Richard B. Saltonstall** of the Udylite Corporation, who gave us some very interesting ideas on the problems of chrome plating over nickel. A lively discussion followed.

We are pleased to announce that a course in the analysis of electroplating solutions has been started, with a *standing room only* class, at the Cubberly Adult High School in Palo Alto, California. This course is under the expert direction of Wilbur Ferry of Eitel-McCullough and credit for the organization goes to Wil and Jim Pope of Hansen Research Laboratory.

Next Month—East Lynn—at the same International Inn.

Arthur E. Schwartz
Secretary

SOUTHEASTERN

Ladies Night Party; Curtis Miller on Control; Want Interim in 1958 and Want Convention in 1962

The little Branch formed in 1946 by a handful of platers has grown into a big branch with great big ideas. Thanks to the untiring efforts and leadership of charter members with eleven years of service and the enthusiasm and further efforts of new officers and growing membership we have established ourselves a strong foothold in our territory and want everybody to know we are here, to come to see us, and to enjoy our Southern hospitality with us, and to support us.

Our Annual Ladies Night Banquet-Dance of August 1957 was attended by 44 people at Druid Hills Golf Club in Atlanta. We had delicious steak, gala dancing on the open air terrace, door prizes, and speeches from all the ladies who attended Montreal, including Mrs. George Taylor, Mrs. Clyde Stovall, Mrs. H. R. Stogner Sr., Mrs. Fred Fulforth and Mrs. Frank Reiff.

Our first regular meeting was held Sept. 13 at the Belmont Steak House, **Chas. I. Lewis** presiding. First plans were discussed for the rapidly approaching Third Annual Technical Session to be held Feb. 14 and 15 under the chairmanship of

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Howard Bone. This year will be even bigger and better than the two previous years, ladies entertainment will be more, a new downtown location is reserved, an interesting list of speakers is being booked, all for a well rounded Educational Session and good time. The Blue Ridge group and Miami Branch will participate with us in cosponsoring the 3rd Annual.

Under the motion of **H. R. Stogner Sr.,** charter member, we decided to ask for the 1958 Interim Meeting and under the same leader we voted to start campaigning right now for the National Convention in 1962. Two new members were elected.

Librarian **Wilmont D. Tidd** introduced our speaker, **Curtis Miller,** vice president, R. O. Hull Company, who spoke on "Recent Trends in Plating Control" followed by our usual questions and answers.

Robert H. Probert
Secretary-Treasurer

SOUTHERN TIER
Successful Summer Picnic; Considering New Alternate Meeting Place

Regular monthly meeting held on Sept. 17, 1957 at the Forest House, Athens, Pa. Approximately 23 members and guests enjoyed a steak dinner and interesting meeting. Our new President **S. Stefanski** opened the meeting and expressed thanks and appreciation from all those who attended the annual summer picnic. Also appreciation directed to **D. Bates** and his committee for the fine work in making all the arrangements for the family picnic.

It was suggested to Mr. Stefanski that we as a Branch have a formal installation of officers. There was also comment and discussion to the effect that the Branch consider looking into facilities for a new alternate meeting place other than the Au-Wa-Gu Hotel in Owego, N. Y. Mr. Bates plans to look into this matter and bring his suggestions to Mr. Stefanski. Other new business included a recommendation that the president appoint a committee for the annual Christmas party by next meeting.

Delegates to the National Convention were appointed as follows: **C. Bound, Chas. Cordier, J. Bunsie.**

Alternates: **Chas. Emory, H. Harper, M. Rake.**

Our librarian, **C. Emory** introduced the speaker of the evening, Dr. **T. Voida,** from Apothacaries Hall. His topic being, "Anodes." A short lecture on selection and care of anodes for nickel, copper, zinc, and chrome baths was followed by an open discussion by members and guests.

B. Rossiter
Secretary

SPRINGFIELD
Electroplating Course Offered; Sanders Speaks on Polishing and Buffing

The Springfield Branch, AES opened the 1957–1958 Season with a Golf Tourney and Outing, held at the Whippernon Club, on Saturday, Sept. 14. There were prizes galore for the low scorer, as well as the dubbers. There were door gifts and a couple of good ones for the horse shoe fans. The Outing committee sparked by **Mel Roske,** did a wonderful job and received a rising vote of thanks from the membership, at the first business meeting of the season. The men who served with Roske were: **Alexander R. Salmond, Martin J. Murray,** and **Walter J. Dyber.**

The first business session was held at Blake's Restaurant, on Monday Sept. 23 The Educational Committee gave a progress report. It was decided from the information on hand, to offer a follow-up to the Fundamentals of Electroplating Course given last season. **Larry Fountain** was appointed chairman, and he chose as his committmen **Ed. Dupuis, Ed. Koetsch, Roger Heroux** and **Elery Gibson.**

The Technical Session for the evening was devoted to the "Basic Aspects of Polishing and Buffing," with **Wayne B. Sanders,** vice president and technical research engineer on mechanical finishing at the Mosher Co. of Chicopee, Mass. A color and sound film accompanied his talk. Questions followed which were answered and an enlightening evening was enjoyed by all.

Henry L. Heissfeld

WATERBURY
Delegates Term Extended; Bylaws Committee Appointed

The first meeting of the 1957–58 season was held at Roger Smith Hotel, Thursday, Sept. 12, in the Colonial Room. President **Spencer Henn** presided. A vote was taken on extending the term of office of our delegates and alternates to the National Convention to August 31, 1958. Mr. Henn appointed a Bylaws Committee; **Ted Voyda,** Chairman, **Ed Washburn** and **Bill Giesker.**

The meeting was then turned over to Ted Voyda, technical chairman. He introduced the speaker, **Arthur Kingsbury Jr.,** of the Hubbard Hall Chemical Co. His subject was "Lawns and their Care." Mr. Kingsbury discussed the make up of fertilizers and their specific use. Judging by the very good attendance and the discussion period that followed, the subject proved very interesting to all.

Dr. Joseph V. Petrocelli, formerly director of research at Patent Button Co., has assumed a new position with The International Nickel Co. Inc., at the Research Laboratory in Bayonne, New Jersey. He has been a member of Waterbury Branch for twenty years, was president of the Branch for the year 1955–56 and is on our Board of Managers.

The Mattatuck Mfg. Co. has resigned its Sustaining Membership. We regret the loss of one of our Branch's oldest supporting members.

Nicholas Topazio
Publicity Director

Harold Leever, left, MacDermid, Inc., greets Branch President Spencer Henn during recent visit of Waterbury Branch to the MacDermid plant.

WESTERN ONTARIO
Maciocе First Speaker in Series

The Western Ontario Branch held its September Meeting at the William Pitt Hotel, in Chatham, Ont.

The speaker was **Frank M. Maciocе,** with the Industrial Filter & Pump Mfg. Co., Chicago. He spoke on the "Waste Disposal Problem for the Plating Industries" and placed before the membership a most interesting paper on this subject.

This is the beginning of a series of speakers on the same subject.

Plans were made for the Annual Ladies Night, to be held on the third Friday in January.

Dave Mainland
Vice President

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P2-8-2

AES Membership Report

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FUTURE MEETINGS

AES

December 6—**Editorial Board,** Hotel Statler, Detroit, Mich.

December 7—**Detroit Branch,** Annual Educational Session and Banquet, Hotel Statler, Detroit, Mich.

December 7—**Structure of the Society Committee Meeting,** Hotel Statler, Detroit, Mich.

December 10-11—**Research Conference** of Project Chairmen, Directors, Fellows, National Bureau of Standards, Washington, D. C.

December 12—**Research Committee,** Sheraton Park Hotel, Washington, D. C.

December 14—**Newark Branch,** Annual Banquet and Christmas Party, Hotel Robert Treat, Newark N. J.

January 10-12, 1958—**Executive Board Meeting,** Hotel Marott, Indianapolis, Ind.

January 11, 1958—**5th Interim Meeting, Supreme Society,** Hotel Marott, Indianapolis, Ind.

January 25, 1958—**Chicago Branch,** 45th Annual Educational Session and Banquet, Conrad Hilton Hotel, Chicago, Ill.

February 1, 1958—**New York Branch,** Annual Educational Session and Banquet, Hotel Statler, New York, N. Y.

February 14-15, 1958—**Southeastern Branch,** 3rd Annual Technical Session, Dinkler-Plaza Hotel, Atlanta, Ga.

May 19-22, 1958—**45th AES Annual Convention,** Sheraton-Gibson Hotel, Cincinnati, Ohio.

June 14-18, 1959—**46th AES Annual Convention,** Detroit, Mich.

July 10-14, 1960—**47th AES Annual Convention,** Hotel Statler, Los Angeles, Calif.

INTERSOCIETY

December 1-6—**American Society of Mechanical Engineers,** Annual Meeting, Hotel Statler, New York, N. Y.

January 27-30, 1958—**Plant Management and Engineering Show,** International Amphitheatre, Chicago, Ill.

January 28-31, 1958—**Society of Plastic Engineers, 14th Annual Technical Conference,** Sheraton-Cadillac Hotel, Detroit, Mich.

February 10-14, 1958—**American Society for Testing Materials,** Committee Week, Statler Hotel, St. Louis, Mo.

March 17-21, 1958—**National Association of Corrosion Engineers, 14th Annual Conference,** Civic Auditorium, San Francisco, Calif.

June 22-28, 1958—**American Society for Testing Materials,** Annual Meeting and Exhibit, Hotel Statler, Boston, Mass.

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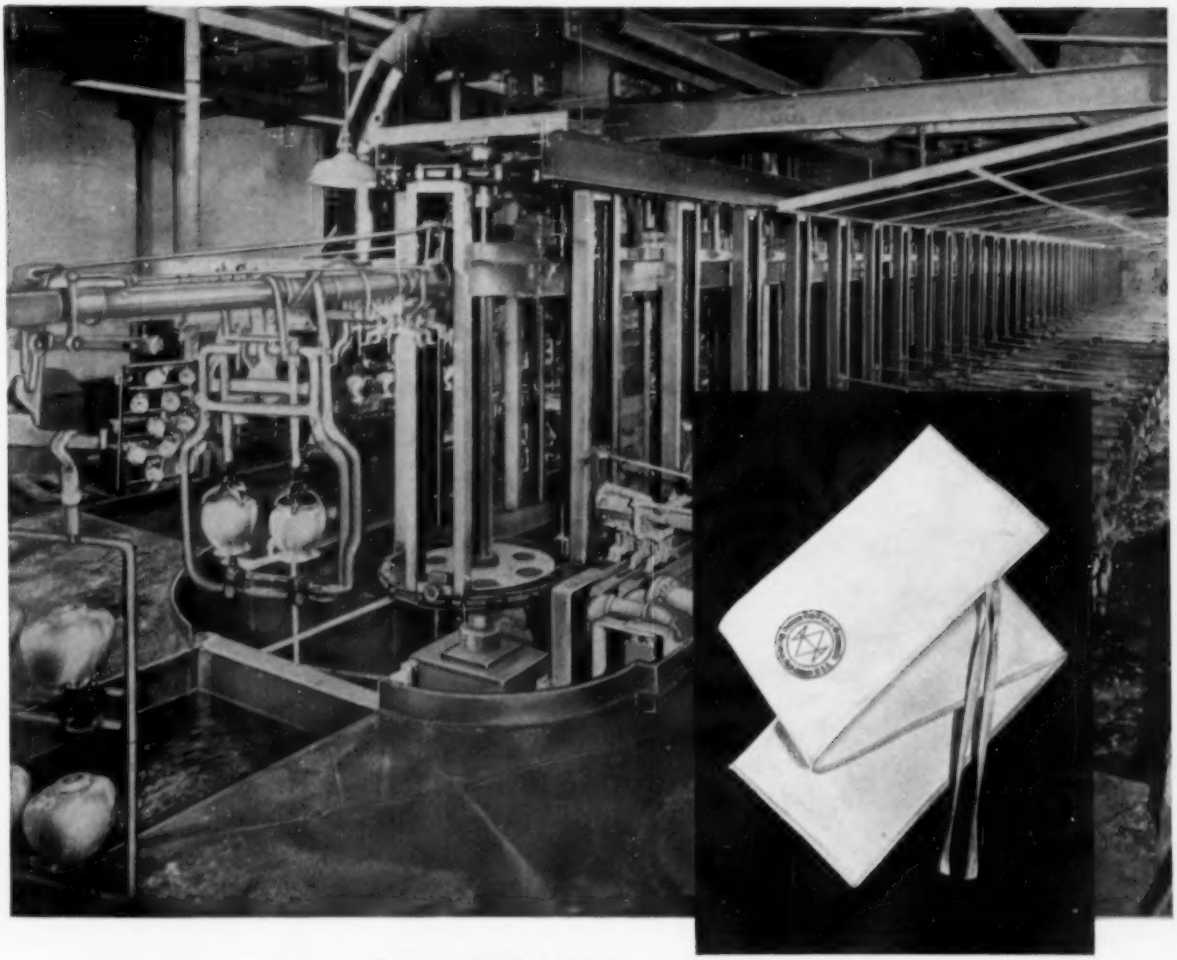

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